

University Bayreuth
Faculty of Cultural Studies

**Pressure in Elite Youth Soccer Competition in Germany
and China**

Inaugural dissertation on obtaining the degree of
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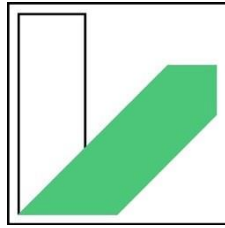
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Game observation and analysis of the 3-versus-3 and 4-versus-4 pressure level in U17 first division soccer competitions

By
Yapu Liang

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Abstract

Pressure is the sharpest weapon in modern football games, including individual defensive tactics, group defensive tactics, and team defensive tactics. European football has always been the highest standard in the world of football, and it provides a broad window to study and analyze the characteristics and development trends of world-class football tactics. In the European arena, each team has its own offensive and defensive playing styles and tactical means. A serious study of the different tactical performance characteristics in the elite competition level in Europe (or South America) will not only help reflect the development of modern football and the latest tactical performance characteristics, but also help to improve football performances in lower level countries. Therefore, the aim of this study is to summarize the predominant characteristics of the mainstream offensive tactics in German elite youth soccer in the Under-17 age group, analyze the common similarities and differences when compared to Chinese elite youth soccer, and provide some active enlightenment and theoretical support for the improvement of football skills and tactics and the development of training in both countries.

The small-sided game (SSG) formats 3v3 and 4v4 are the most reflected sub-units of the soccer team's organization. The more complex offensive and defensive organizational patterns of teamwork are based on and composed by 4v4-elements. Furthermore, the SSG format 4v4 serves as the basic training form in modern soccer education and training.

This study is based on quantitative game observation by means of kinematics videography, and descriptive and analytical statistical analyses. The empirical part focusses on the video analysis of selected U17 competition games of the German Bundesliga-clubs SG 1899 Hoffenheim and RB Leipzig, as well as on the Chinese first-league team FC Beijing Guoan. In all games, the analysis focused on the comprehensive systematic statistical parameters of the 3v3- and 4v4-use situation.

The following aims shall be focused on throughout the research:

1. Comparison of 3v3 and 4v4 pressure levels and intermediate and final match

results.

2. Comparison of 3v3 and 4v4 pressure levels and match durations.
3. Comparison of 3v3 and 4v4 pressure levels in German and Chinese elite U17 soccer.
4. At the moment of the ball release, the average pressure on the player at the moment of receiving the ball is lower than the pressure on the same player at the moment of the release of the ball.
5. Inside the 30-meter-zone in front of the goal, pressure is higher than in the midfield zone.
6. The pressure is higher in forced release errors than in successful release situations.
7. When the offensive 3v3 and 4v4 area is larger, the result of the game will be better and this offensive behavior is associated with a positive effect.

In the second half of the match, the area of the 3v3 and 4v4 configurations in team offense, as well as the total area of the six and eight resp. athletes of both teams increased compared to the first half of the match. The reason for this phenomenon might be the general increase of fatigue and, depending on the match standing, the decline of the player's will to further invest in his team's performance. The reduction in running distances might have led to the widening of the pitch area covered by the players in the 3v3- and 4v4-formats. At the same time, on the 3v3 and 4v4 defensive end, there was no significant change as the game time prolonged. Although the defensive player's fatigue increased, the team on defense executed an unchanged level of compression on the pitch similar to the first half. Thus, it can be seen that the basic 3v3 and 4v4 defensive formation is stable, and the defense might be easier to perform from a fixed and drawn-back formation to resist the opponents' attacks, with a reduced need to frequently cover long distances. However, as the offensive team advances in pitch space, the distance between the defensive players and the nearest players with and without the ball gets gradually smaller, leading to more physical contact and more fouls, forcing the opponent to protect the ball possession and not to allow for attacking and playing comfortably.

In the case of behind scores, the defensive pressure is higher. The team in the lead position experiences the weakest pressure. According to the data analysis, there is a significant difference in a team's behavior when they are in the lead, in a tie situation, and in a behind score. That is to say, the pressure of athletes is different according to the actual score of the match. In general, the winning team is able to create a larger area in the 4v4 confrontation situation, and the distance to the nearest defender is higher than in the team that lost the competition. This difference in the 4v4 area is significant.

When the Goal Difference is negative, the defender who is behind the score is positioned farther away from the player with the ball, and this value changes significantly, indicating that the losing team demonstrated tactical flaws and instability in defensive play. When the score is in lead, the overall pressure on the player with the ball will rise on the pitch, and the size of the area covered by six and eight players, respectively, is the most obvious parameter, indicating that more intense pressure makes the possession of the ball more difficult, and as the players' density on the court continues to increase around the ball zone, the pressure on the offensive players becomes greater.

At the ball release, the average pressure on the releasing player is higher than the pressure at the time when the ball is received. The difference between the release and the receive in the game is significant. The absolute difference between these two instances in the 3v3 and 4v4 areas in German games is far higher than in Chinese competitions. It shows that in the receive situation, the distance between the German athletes and the defenders was higher, but at the release, the distance was dramatically reduced. This shows that German athletes are more active and more synchronized in the run-up. Chinese athletes show relatively fewer running activities and are less interactive when possessing the ball; thus, they lack the ability to change offensive behavior and to actively increase the opponent's defensive range. Moreover, the pressure at the release of the ball is higher than the pressure at the receipt of the ball, which is underlined by the reduction of the distance between the nearest de-fender and the player with the ball.

The soccer field is divided into three parts: the backcourt, the midfield, and the frontcourt. The 30-meter front field is a dangerous area, and all players will be more active inside this part of the offensive and defensive zones. Thirty meters away from the goal, the 3v3 and 4v4 confrontation has the most vigorous intensity. As the offensive players advance to the 30-meter zone in front of the opponents' goal, this is the most effective area where the attackers can directly shoot or indirectly score. So, this zone will be more protected by the defensive team. In the area of 30 meters in front of the defensive goal, the defending teams will generally arrange 6–8 defenders to execute one-on-one situations, two-on-one, or even three-on-one man-up defense on the player with the ball to prevent a goal. The defense will invest more effort and develop higher pressure against the offensive players. To avoid such pressure of the defensive players, in the German offensive 3v3 and 4v4 configurations, the area is larger than in the Chinese teams. This is true both in terms of offensive area and distance of the player with the ball to the nearest defender.

In the case of a successful release, the distance between the ball-handling player and the nearest opponent is significantly higher than when an erroneous release is performed. Therefore, the level of pressure on passing mistakes is higher than the level of pressure at the time of successful release. This could also be seen consistently in the comparison between the soccer teams from China and Germany. If the player with the ball does not have enough time to make the right decision, or if the defender executes too high pressure on the player with the ball, this will lead to a higher probability of a release error. The defensive team can strengthen its defensive success by increasing the pressure on the player with the ball, forcing him to make mistakes. If the pressure level is low, the player with the ball can better concentrate on the ball release, making better decisions, and releasing the ball safely to his teammates. Therefore, a higher quota of successful releases usually occurs at a low-pressure level.

The higher the average distance between the player with the ball and the nearest defender, the higher the probability of winning the game. According to the investigation of the different game situations, the reduction of the defensive 3v3 and 4v4 area has a close relationship to the overall result of the competition. If the distance to the player with the ball is reduced or properly controlled at a low level, there will be a positive effect on the game result, increasing the probability of a final victory.

Keywords: football, 3v3 and 4v4 area, local pressure, attack and defense

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Abbreviations

MATLAB	MATrix LABoratory
Stata	Statistik-Software
FIFA	International Federation of Association Football
TV	television
U	Under
v	versus
MP4	MPEG-4 Part 14
AVI	Audio Video Interleaved
SSG	Small Sided Game
Euro	European Monetary Unit
UEFA	Union of European Football Associations

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1. Introduction

1.1 Statement of topic

The training model based on the dominant 3v3 and 4v4 small-sided games (SSGs) originated in the Netherlands in the mid-1980s. The idea was to transfer the positive features of street football as a child's game continuously in a specific mode, thus producing a 3v3 and especially the more worthwhile 4v4-based football education and training model in this context (Zhang, 2014). The purpose of the 4v4 football training mode is to create a child-centered combat situation in which the child is not bound by a fixed tactical form, thus enhancing the children's technical skill and tactical decisions, reducing reaction time, and the technical execution of the game actions, rather than being limited to a sole technical exercise.

This SSG model is most widely used in the Netherlands, and Ajax Amsterdam developed a large number of training exercises on the basis of this format, delivering a large number of stars to the major clubs. After more than 20 years of a different development, the soccer clubs in the United Kingdom (UK) also began to accept and take over this training model. Today, in the UK, this model is the most commonly used SSG format and the most effective method of teaching (e.g., in the Manchester United Football School). In this club, some world-class players trained with this concept, such as the golden generation Beckham, Giggs, the Neville brothers, and other players.

As one of the world's top football teams, the German Football Federation (DFB) has won many championships and honors in significant events. At the same time, China has been vigorously developing football in recent years, striving to advance to a football power in the future. In this thesis, youth soccer performance in both nations were analyzed, and the differences and similarities regarding the pressure in youth elite soccer match play is discussed.

1.2 The goal and purpose of research

As the most widespread and influential sport today, soccer is a top-tier sport in the world. Because of its rich connotation and players' mastery, competition match play is regarded as an art. The complex and various technical and tactical characteristics of soccer require players and coaches to analyze their opponent's thoughts and tactics during the game and change their tactics and styles at any time. Under the conditions of high-speed running, fierce confrontation between players, rigorous defense on both

sides, and rapid situation changes, modern soccer develops the level of techniques and skills succinctly, accurately, and skillfully. In terms of tactical characteristics, modern soccer is specifically characterized by the rapid conversion of defense to offense and vice versa, the speed of the attacking and defensive game actions, and the confrontation between attacking and defending players. In modern soccer, the attack and defense transition time intervals are getting shorter, and the number of conversions is increasing (Li & Ning, 2017).

The number of technical and tactical game actions has increased, and the distance between the position of the player with the ball and the opponent-marking player has decreased. Furthermore, the total running distance is increased, which reflects the more intense and faster playing style, as well as the improved physical requirements of the players in the competition. Second, the speed of attack and defense is faster. The essence of the football game is to seize the space, compete for time with the ball, effectively control the ball, handle the ball reasonably, and finally achieve the aim of shooting the ball into the goal of the opposing team. A great number of football players are capable of effectively handling the ball, which is the key premise making a goal. The precondition for controlling the ball and handling the ball in a dominant way is the preemption of space and the competition for time. Pressure on the opposing team is the most critical factor in controlling time and space, and efficient cooperation is an essential means to fight for time. Third, the confrontation between the offense and defense is more intense. The looting of space in contemporary foot-ball matches is centered on the two penalty areas, and the midfield gradually also extends widely to both sides of the pitch.

In order to control a particular space, the players use physical collisions in one-on-one situations, the strength and tightness of the body, the tactical struggle for the initiation of a breakthrough, the rush to shoot, and other forms of confrontation, so that the confrontation is becoming more frequent and intense.

In training, 3v3 and 4v4 is the fundamental component in line with these three points. The quality of training is directly related to the decisive factors of the development of technical and tactical elements, and subsequently for success in the games. Therefore, coping with pressure has become one of the significant training tasks of high-level teams. In training, the fast offensive and defensive conversion claims priority when the structure of SSGs is designed from 3v3 over 4v4 and 6v6 up to 8v8 to support the successful completion of technical and tactical elements in the playing style of the whole

team.

In summary, under the premise of the continuous development of modern soccer, we must recognize the importance of the 3v3 and 4v4 technical schemes in the game, grasp the winning rules of soccer teams, and understand the technical and tactical characteristics of soccer especially for offensive and defensive game situations. There must be a scientific, objective, and accurate understanding of the cooperation between players and groups of players. Research must analyze the rules of football development from an early age. In light of this, in competition games and in the usual training, the 3v3 and the 4v4 SSG format is the core exercise in the technical and tactical training of high intensity and high confrontation. Throughout the technical and tactical training sessions in youth soccer, the training process is focused on the small-sided games-based education of each athlete.

In this study, the German football U17 and the Chinese football U17 age segment were selected as the research subjects. Because this age group is the most important stage of the transition to professional soccer, and the stereotypes of the techniques, skills, and tactics, as well as the players' strategic awareness begin to become the athletes' individual characteristics. In the first stage of this thesis, the various technical and tactical-level characteristics of youth soccer teams will be introduced. Secondly, the 3v3 and the 4v4 confrontation situation appearing as a core element in the game are screened out, and the collected data will be deeply analyzed by a reasonable research method to discover the influence of different 3v3 and 4v4 pressure conditions on the game. Finally, based on the conclusions drawn, the most reasonable method of the use of 3v3 and 4v4 SSG formats will be revealed, which provides a reference framework for the future development of football.

2. Literature discussion and theoretical framework

2.1 Definition of terms

2.1.1 Technical and tactical concepts

In the textbook Sports Training sports technique is defined as follows: "Sports technique refers to the way athletes use their physical abilities to complete their movements reasonably and effectively" (Tian, 2000). Sports techniques exhibit different characteristics in different sports. Football technique is a general term for reasonable individual actions used in football matches. From the purpose of use, there are two significant categories of offensive technique and defensive techniques. In regard to the structure of the technical action, it can be divided into receiving, releasing, or shooting or dribbling, as well as from the defender's perspective into intercepting and the goalkeeper technique. In summary, the football technique is not only a single element, but also a technical movement system consisting of single techniques, a combination of techniques, and a combination of several combined techniques.

Football tactics are the general performance of individual and collective cooperation in the game in order to defeat the opponent and according to the subjective and objective reality. The practice of the competition proves that the skillful cooperation use of the whole team is an essential factor in winning the victory (Zheng, 2012).

2.1.2 Technical and tactical relationship

From the definition of tactics, we can see that the relationship between technique and tactics is not only the rational application of the technique in the game but also the strategy and integration of all aspects. In football games, the basic ideas about the relationship between technique and tactics are mainly the following: "The relationship between technique and tactics has always been clear. The practical experience of athletes: technique is the basis of tactics; tactics are made of various technique and their situation composition". "How to use the personal technique, how to force, how to find the touch site, is a technical problem, and the ball to what to drop, how to match, is a tactical problem" (Tian, 2000). "Combined technique is a bridge to tactics"(Tian, 2000). "Technical unit refers to the actualization of a single technique, the tactical unit is the basic cell that constitutes tactics, more than two tactical units constitute a single tactic, and several individual tactical combinations constitute a tactical system - a tactical

style"(Tian, 2000). The technique is the basis of tactics. Tactics are the effective combination and application of the various techniques in the course of the game, and the two are inseparable.

2.1.3 Definition of pressure

In the context of football, the “pressure level” can be adequately defined as the area around the ball player in which he or she and one or more athletes of the opposing team are in their respective playing situation. The “average pressure level represents the arithmetic mean of the area individual competition situation” (Loy, 2006).

2.2 Research status

The existing research relative to the question of pressure in youth soccer is rare and is highly targeted for similar topics. In particular, research on U17 age groups is not easy to obtain because most of the precise calculations of the game are more focused on adult athlete competitions.

One of the articles involved the area of the field and the 4v4 confrontation (Loy, 2006), and the confrontation was regulated from 11v11 to 1v1 (see Table 1). As the author says, this method is mainly used for training under certain conditions. It is only hoped that athletes will find proper training and competition status through a specific environmental framework (Tian,2000).

However, to date there has been a lack of knowledge about corresponding restrictions of an SSG format to promote tactical and technical skills. Thus, knowledge on this issue is warranted, because targeted training is the only way to improve the soccer technique and skillful play behavior. Without specific knowledge about the competition situation it is difficult to determine the value of pressure in a particular environment. So, at the moment the regulations given in the literature are mostly subjective.

Table 1. The area of the field and the 4v4 confrontation (Loy, 2006)

players	pitch size	players	pitch size
11 v 11:	100 x 60 m	5 v 5:	40 x 24 m
10 v 10:	90 x 54 m	4 v 4:	30 x 18 m
9 v 9:	80 x 48 m	3 v 3:	20 x 12 m
8 v 8:	70 x 42 m	2 v 2:	10 x 6 m
7 v 7:	60 x 36 m	1 v 1:	10 x 6 m
6 v 6:	50 x 30 m		

The technical and tactical diagnosis and evaluation of football matches in recent years have generally developed from qualitative analysis, from general indicators to specific indicators, from manual statistics to computer-aided analysis and human-computer interaction, from simple mathematical statistics to data mining (Wei,2017). The aim is to optimize the process of the players' decision. At present, the system of technical and tactical analysis of football matches is probably based on data mining, artificial neural networks, system dynamics, decision support systems and other theories and methods to diagnose systematically, analyze, evaluate and predict the skills and tactics of athletes in match play.

In summary, the constant innovation of football skills and tactics, the variety of play styles, formed a gesture of a hundred flowers, but the scientific analysis and diagnosis methods of football skills and tactics, the description of football skills and tactics is often executed only at the level of qualitative analysis. Accumulating a large amount of data, the question is how to make full use of and find useful and often overlooked important information, and this has become an important task also in soccer research. Although the data mining processing using MATLAB software is also used in the sports field, the application in the sports field is at least in China mostly still in the stage of theoretical discussion, and still immature (Liu, Hohmann, Castro, & Sörgel, 2014). The domestic use of this software for the analysis of football skills and tactics is even more infrequent. So, in this study the author aims at a more mature training model based on a systematic game observation which can be used to diagnose the technical and tactical characteristics of youth soccer athletes. The methods used in this study can provide a reference framework for the future analysis of football and other ball games.

2.3 Literature review

In the following, the theoretical background of the study on pressure in official under-17 soccer games will be reported. This outline shall help to underline the importance of the 3v3 and 4v4 situation as analytical basis of the empirical game observation study, as well as to the proof the relevance of especially the 4v4 small-sided game format as the most important technical-tactical exercise, at least in German soccer education and training (<https://www.dfb.de/lehrer/weiterfuehrende-schule/>).

(1) Scientific methods in the analysis of small-sided games

The 4-4 small-sided game is the most commonly used and most effective training method for Manchester United Football School. It is usually arranged according to the most basic dribble, releasing, stopping, shooting, and other personal technical studies. The coaches guide the students usually at the 25m × 30m venue and carry out 4v4 confrontation exercises. In such a small-sided game format there are more cases of 1v1 and 2v2 situations with more scenes of scoring.

In theory, the maximization contact ball in football training. More contact opportunities can improve the abilities of players more effectively. More scores in a game can stimulate interest in learning and technology and decision-making ability when training, especially youth players (Zhang, 2012).

In theory, the maximization of the number of ball contacts is paramount in football training. More contact opportunities can improve the abilities of players more effectively. More scores in a game can stimulate interest and motivation in learning and technical and decision-making ability when especially training the youth players (Zhang, 2014).

In a soccer match, the most common game situations are 1v1 and 2v2, while the collective 4v4 situation is the baseline for the education of group behavior of the participants. When the total number of participants is more than eight people, the ball will be transferred to another pitch area to form a new group technical. 2v3, and 3v3 up to 4v4 formats in training sessions can simulate a formal football game, which is unmatched by other training methods.

Tiedemann, Francksen and Latacz-Lohmann (2011) investigated the 3-3 situation in elite soccer competition and presented a new model for assessing the performance of athletes in football competitions. Based on Data Envelopment Analysis (DEA), a

method called non-bumping is used, which is particularly novel and estimates the player's efficiency score considering its position (Tiedemann, Francksen, & Latacz-Lohmann, 2011). The model for this kind of data analysis is mainly used for data collection in the top league football players in Germany, which has been applied from the 2002/03 to the 2008/09 season. The findings indicate the team's average player efficiency score and the relationship between the team's rankings throughout the major leagues at the end of the season, which are positively related. What is unique is that this meta frontier method is used to identify and quantify the best position of the football player in the team.

Duarte and Araújo (2012) used a hybrid model ANOVA to compare the variables selected for these movements at three critical moments. The variables all showed strong symmetry and described the coordinated attack and defensive behavior of the athletes at all stages of the game. In contrast, the pitch surface area analysis of each group does not bring out a distinct relationship between the groups. However, as time goes on in offense and defense situations there was a significant increase in the difference of the occupied area. The results of the survey highlighted that significant changes in grouping behavior occurred before the assisted passage e.g., the loss of stability of the three-to-three sub-phases. The method of the data capturing procedure is visualized in Figure 1.

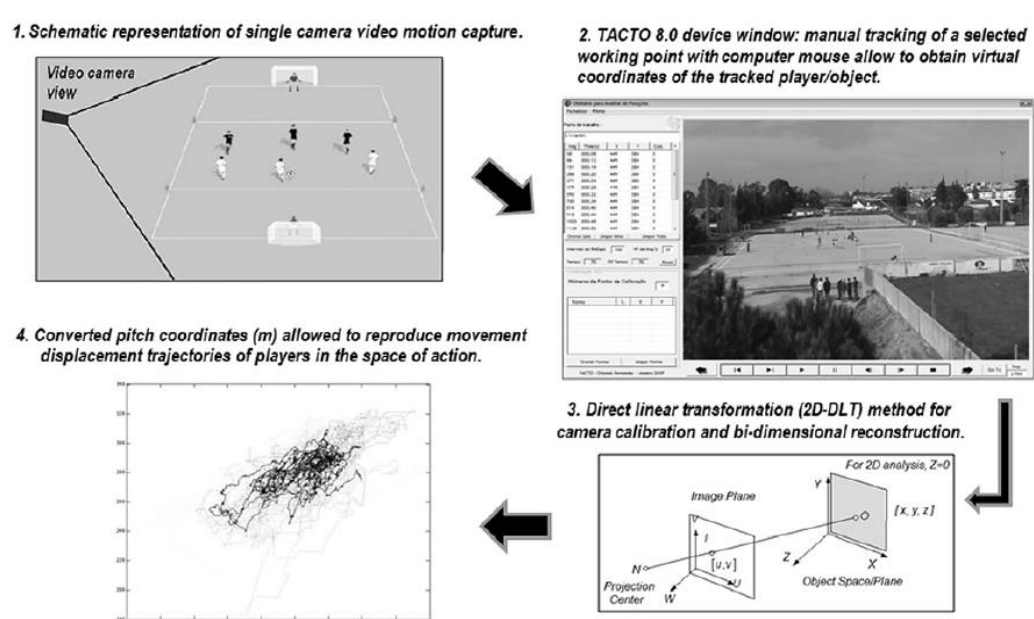


Figure 1. Direct linear transformation demonstration (Duarte, Araújo, Freire, Folgado, Fernandes, & Davids, 2012)

Dellal and Owen (2012) compared the effects of the simple changes in the technical and physical needs of professional football players in five competitions in a short four-minute 4-4 small-sided game (SSG) on 11 games. According to the observed indicators, including heart rate (HR), blood lactate (La), perceived rating of exertion (RPE) and other aspects of physiological and technical abilities in the SSG. Compared to the match play, showed that the total distance covered of all competition positions, the high-intensity running activities (sprint and high-intensity running), the total number of confrontation and the ball loss rate increased significantly ($p < .05$).

Garcia, Román, Calleja-González, and Dellal (2015) found that there is no significant difference in the surface area of the original competition and their training form. The research has described and analyzed these aspects in different degrees. However, each situation surface area and the action of the game's offense have a considerable impact. The overall aim of this paper was to analyze the impact of quantitative and qualitative performance types on team athletes and team performance to determine the impact of these elements on specific tactical outcomes. The performance indicators showed that the representative variables presented a considerable degree of consistency from 0.61 to 0.80. For the percentage indicators (time and pitch areas), the percentage of each of them was also compared. The results show that there is no difference between the different modes, but the offensive behavior has a relatively more significant impact on the match result.

Cooper (2006) proposed that 4v4 is not a new concept, as the Dutch have been playing it since the mid-1980s (Cooper,2006). The Dutch coach Rinus Michels (2004) pointed out that a good coach uses the basic standards of street football to achieve the vision of grassroots development. They recognize that these elements create a natural process that provides the best outcome for the younger generation: Effective training. (Michels, 2004).

When comparing the data of the 8v8 competition match with the data of the 4v4 SSG format, Cooper (2006) found the following results:

- Number of releases - increased by 135%;
- Scoring attempts - increase by 260%;
- Number of goals scored - increased by 500%;
- Number of 1v1 encounters - increased by 225%;
- Number of dribbling skills (tricks) - increased by 280%;
- From the interviews conducted, 80% of people expressed optimism;

Table 2. Analysis of different variables (Hodgson, Akenhead, & Thomas, 2014)

Distance covered (m) for speed and acceleration variables in small-sided games played on small, medium and large pitches (Values are mean \pm SD).

	Small pitch	Medium pitch	Large pitch
Total distance	1532 \pm 145	1941 \pm 148 ^a	1934 \pm 133 ^a
High speed distance	0 \pm 0	29 \pm 28	61 \pm 47 ^{a,b}
Sprint speed distance	0 \pm 0	11 \pm 21	16 \pm 27
Total acceleration	230 \pm 111	356 \pm 72 ^a	327 \pm 70 ^a
High acceleration	23 \pm 18	38 \pm 10 ^a	32 \pm 12
Moderate acceleration	57 \pm 36	94 \pm 24 ^a	83 \pm 24 ^a
Low acceleration	150 \pm 58	223 \pm 40 ^a	212 \pm 37 ^a
Total deceleration	198 \pm 89	314 \pm 67 ^a	298 \pm 68 ^a
High deceleration	18 \pm 15	34 \pm 12	31 \pm 12 ^a
Moderate deceleration	46 \pm 30	83 \pm 20 ^a	77 \pm 26 ^a
Low deceleration	133 \pm 44	198 \pm 37 ^a	190 \pm 31 ^a

^a Significant difference in comparison to small pitch ($p < .05$).

^b Significant difference in comparison to medium pitch ($p < .05$).

In conclusion, it was agreed that the children become more proficient in the 4v4 SSGs. This kind of competition is different and brings different skills. Children become more complete football players, and who is the defender and the attacker are not clear (Hodgson, Akenhead, & Thomas, 2014).

This article provides new data support for small venue competitions, proving that the acceleration patterns observed in SSGs are more frequent than during a normal professional game cycle.

From this study it can be derived that the small-sided games can allow for the density type adjustment by the coach to achieve the purpose of stimulation. Both the coach and the athlete must be aware that changes in the size of the pitch area of the confrontation will affect the physical and technical needs of the athletes of the SSGs (see Table 2).

Performance diagnosis is a core component of training science (Weineck, 2014). Regardless of any diagnostic method, the first aim is to record the state of the athlete's current status and then to draw conclusions about all aspects of athlete performance. Necessary prerequisites for athletic performance can be conditional, technical, psychological, social, tactical, constitutional, and health-related. This work is limited to the tactical dimension. Especially in sports competitions, the method of game observation has become a competitive diagnostic tool. Here can distinguish between game description, game analysis, and game simulation (See Fig.2).

Systematic Sports Game Observation		
Game Description	Game Analysis	Game Simulation
Purpose: <i>Game Statistics</i>	Purpose: <i>Game Pattern</i>	Purpose: <i>Game Success Factors</i>
Example: <i>Ball Control Phases</i> <i>"Heat Maps"</i> <i>Attacked Index</i>	Example: <i>Pass Consequences</i> <i>(Data Mining)</i>	Example: <i>Game Moves</i> <i>(Markov Chains)</i>
Access		Information

Figure 2. Systematic game observation (Liu, Hohmann, Castro & Sörgel, 2014)

Position analysis proposes the method of tracking of the soccer players and the ball, and the soccer video is caught from TV. In this way, the areas are matched by the wireframe model into lines. In the videos, the potential of the proposed way has been used for video analysis from TV, including camera pan and zoom (see Fig.3).

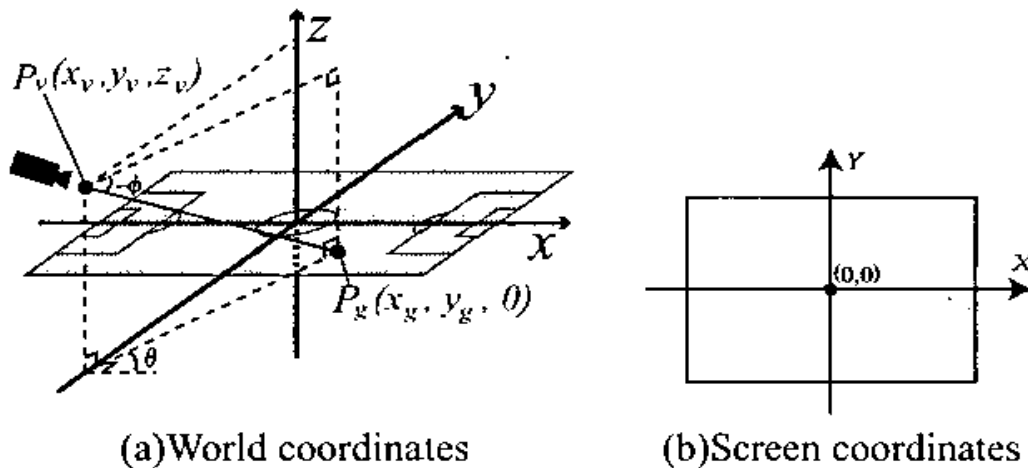
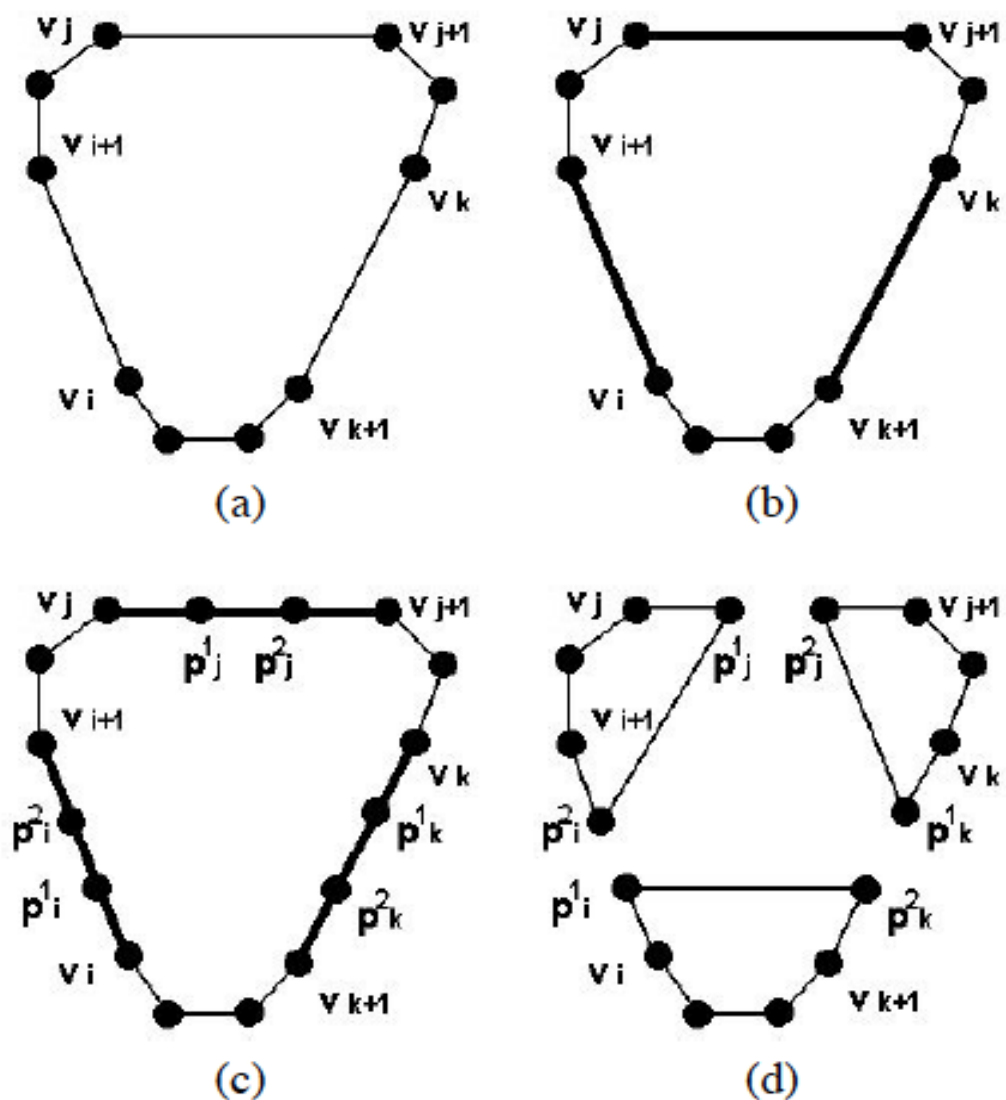


Figure 3. The camera is converted to the coordinates of the screen (Loy, 1995)

An extended snake model for real-time multiple object tracking was described by Watanabe and Haseyama (2004). The methods described herein are capable of tracking non-rigid objects in a color video sequence. Even if the primary camera is moving, the data and images can be processed in real-time. There are two main

extensions to this method, first multi-target tracking, followed by multi-resolution analysis. The model has undergone tests on soccer video sequences to show the quality of the proposed method.

Future work will include the use of more powerful color energies, such as those proposed by Lefèvre and Gérard (2002). Handling object tracking on a complex background may also require a background/foreground separation step. Finally, implementing the proposed algorithm on a multiprocessor workstation is considered to continue to reduce computation time (See Fig.4).



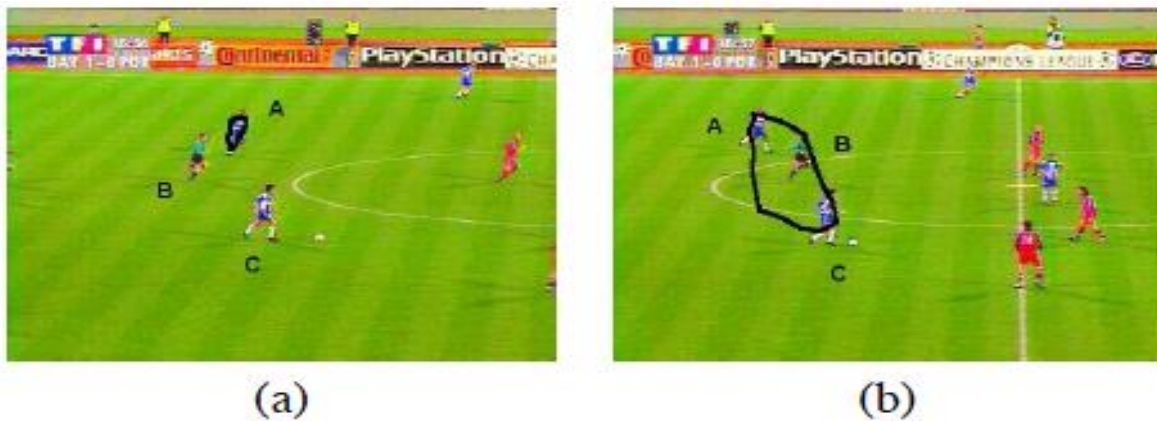


Figure 4. Model based on player position (Lefèvre, Gérard, Piron, & Vincent, 2002)

Lefèvre and Gérard (2002) developed a motion analysis system for quantitative evaluation of teamwork in soccer games. In their article, a sports analysis system for a soccer match is proposed. The direction of this system is based on the quantitative assessment of the cooperation between different teams based on the presence of players on both sides of the game.

The two main reasons of team cooperation evaluation are space area management and cooperative movement between team members. In order to quantify them from the many moving images obtained, there are proposed two new features; “minimum movement, time mode” and “dominant area” (Lefèvre, Gérard, Piron, & Vincent, 2002). By experimenting with real competition scenarios, it is recommended that the proposed system be a new tool to support the evaluation team, by means of the “Minimum moving time pattern” theory (See Fig. 5).

Taki and Hasegawa (2002) solve the problem of video tracking in the case of overlapping multiple players. In more detail, this study is mainly a game analysis of the pressure situation of the players in football and offers the possibility of transfer to the 4v4 training configuration. Firstly, an overview of the status quo of system game observation is given, and the importance of pressure level and the so-called “small game” in training business are given. The applied research method was then explained. After introducing and discussing the results, the method was rigorously examined to finally predict the possible application of systematic game observation in terms of football pressure level.

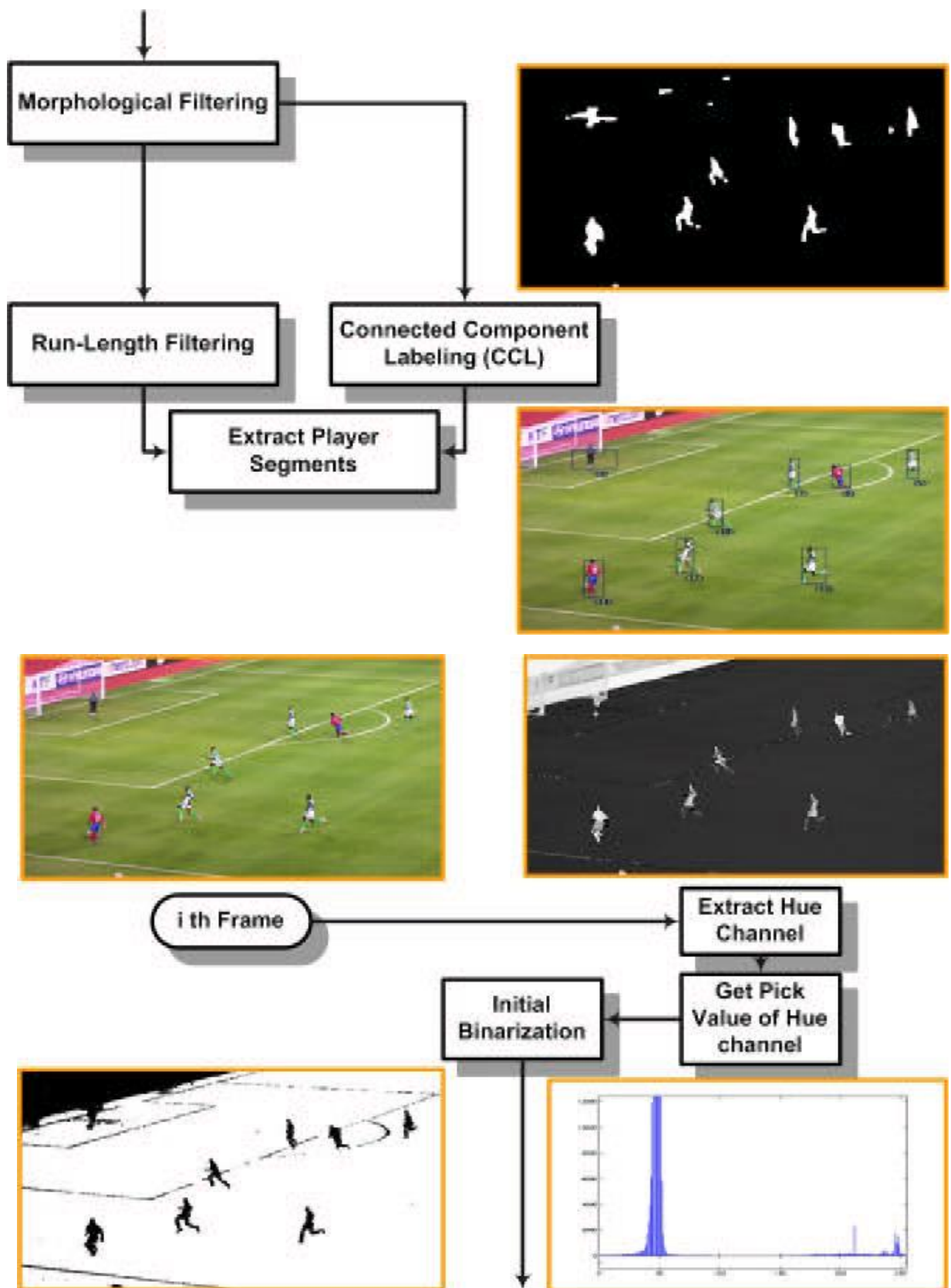


Figure 5. Image conversion and character tracking (Lefèvre, Gérard, Piron, & Vincent, 2002)

A field detection method combining color and local consistency is proposed (Bai, 2014). Existing field detection methods use color features to detect field pixels in an image, and cannot conclusively exclude green pixels that do not belong to the field area. Aiming at this problem, this paper introduces the local consistency feature based on color features and performs site detection through feature fusion.

In order to determine the detection threshold of local consistency, this paper proposes a local consistency threshold selection method based on two-dimensional histogram and a maximum inter-class variance method based on the color constraint, according to the main color characteristics of the field pixels and the characteristics of the local entropy image. Local consistency threshold selection method. Experiments show that the proposed method can adapt to various environmental conditions in site detection and can detect the site area more accurately.

Player-based detection method based on statistical classifier is superior to rule-based player detection in detecting results law. However, existing methods require the use of manually labeled training sample sets to train player detectors, which is labor-intensive. In response to this problem, this paper proposes an automated player detection method. Inspired by the principle of specific recognition of human-object categories, this method uses a class of support vector machines to train player detectors.

At the same time, according to the clustering of player samples, the method uses fuzzy partitioning criteria to divide the decision values dynamically and proposes a kind of support vector machine with fuzzy decision-making, which reduces the measure error caused by inadequate representation of the training sample set acquired automatically. Finally, this article uses a set of guidelines to achieve automated player sample acquisition and uses these player samples for player testing experiments. Experiments show that the player detection method proposed in this chapter can achieve better detection results when using the automatic acquisition of the training sample set, and can detect the player more automatically.

A soccer detection method based on category weighted s FCM and dynamics based on multi-region search are proposed.

Kalman filter football tracking method. In terms of football detection, the narrow football area increases the difficulty of extracting distinguishing features, which brings great difficulties to football detection. In response to this problem, this paper proposes an automated soccer detection method based on class weighted s FCM. The method first optimizes the error function of s FCM according to the characteristics of the number of

pixels in the foreground object and then combines the double threshold strategy and the shape exclusion method to realize the automatic soccer detection.

An attack mode analysis method based on football offset rate is proposed. The existing attack mode analysis method uses the field sequence of the football field as the position feature of the football and loses more positions. In response to this problem, this paper designs a soccer position feature based on a relative positional relationship: the football offset rate, inspired by the fundamental reference frame theory of human spatial cognition. In order to detect the requirement of the foul line in the process of football offset rate extraction, this paper combines directional filter, low bilateral filter, and Hough transform to realize automatic off-line detection. Finally, this paper analyzes the offensive mode using the extracted football offset rate. The experimental results show that the offensive mode analysis method based on football's offset rate can detect the attack mode in the video more accurately, and can analyze the sub-patterns contained in the attack mode.

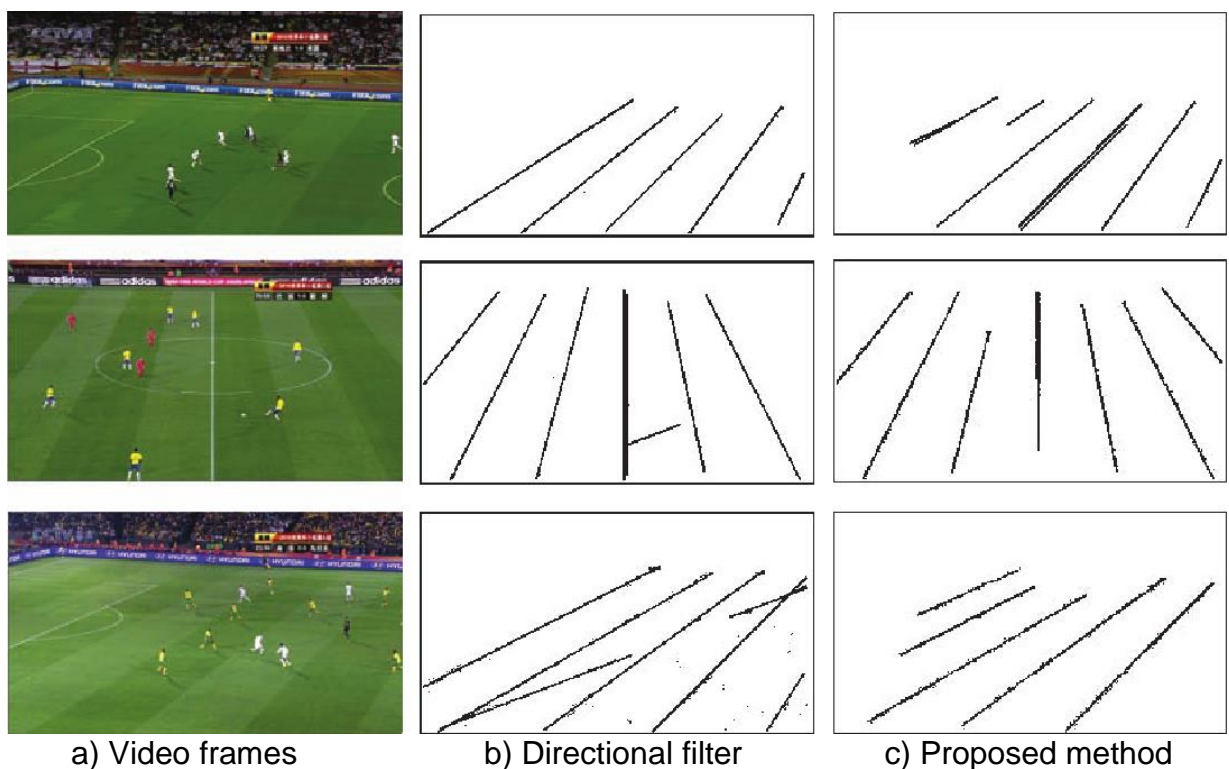


Figure 6. Examples of the offside line detection results (Bai, 2014)

(2) Training methods on the basis of small-sided games formats in soccer

In recent years, new tactical indicators have emerged in the football world to increase the matching analysis of related games (Clemente, Couceiro & Martins, 2012). Of course, innovation indicators need to be continuously updated to improve the efficiency of training guidance. Therefore, this paper aims to study surface area metrics and their propose effectiveness. The contest area provides some useful information about the coordinates of team member positioning. Also, the target analysis of the active game area is based on the ball's ball control and the final match of the 7-a-side football game in the final, and each team's game is also analyzed.

On the research of offensive sequences in youth soccer: effects of experience and small-sided games by Almeida and Ferreira (2013) was designed to analyze the main effects of training exercises and small-scale competitions.

The main form of competition is the 3v3 plus goalkeeper, 6v6 plus goalkeeper.

Some of the fundamental performance indicators used to assess the skill and tactical-level of athletes have been used. When there is no interaction between players, it will affect the offense. Non-parametric MANOVA reveals the factor "experience lev-el."

Especially the 6v6 plus goalkeeper. While experienced players can organize longer aggressive steps, the ball is more often released between them, and inexperienced participants show a faster offensive sequence and more individual characteristics. Also, significant differences were observed in the course of the game and the final match results ($p < 0.05$). Compare the order within each group when playing in a small range. Evidence supports small venue competitions as a specific training method with several purposes. However, you should always consider the personal limitations of players who manipulate game formats.

In this article of research on the influence of 4v4 football training mode on the endurance level of pupils (Li, Ning, & Liu, 2017) the training level of the experimental group trained by the 4v4 small-sided game format was more evident than that of the control group using the traditional physical training method during one cycle of training. The 4v4 football training mode not only contains a large number of personal skills and tactics but also includes a wealth of teamwork skills and tactics, through more running position and 4v4 acceleration, confrontation, significantly improve the player's aerobic endurance and anaerobic endurance level. The 4v4 training mode is not demanding on the size of the venue. It is usually practiced or contested in a 20m × 30m area. Due to the shrinking of space, the number of players touching and dominating the ball is increasing, which

is helpful for the establishment of the foundation of youth football.

This article put forward six defensive ideas appearing in 4v4. The first is to grab the opponent's players nearby and try to win the ball back. The second is to delay the attack: the frontcourt players prevent the offensive players from advancing as a whole and fight for the defenders to get back in time. The third is to help prevent: reduce the gap behind the players, the nearest players to make up for the players. The fourth is shrinking defense: shrinking the defensive formation, moving with the ball as a whole. The fifth is patience: not blindly grabbing, keeping patience, the timing of grabbing and shrinking is critical. The sixth is predictability: shrinking the defensive formation will make the offensive player purposefully fall into the defensive trap. For example, the ball is forced to run to the bottom corner.

Li and Ning (2017) focus on how the significant data era and computer machine learning techniques can help to solve problems in the game and can optimize tactical decisions for the team as well as theoretical models. Based on experience, it is first to break through the barriers to data and technical indicators. The current work of the authors focuses these issues in professional football tactical analysis and proposes a technical direction aimed at introducing significant data technique into the field of professional football research. The method can also be used as a guide for other sports disciplines (See Fig. 6).

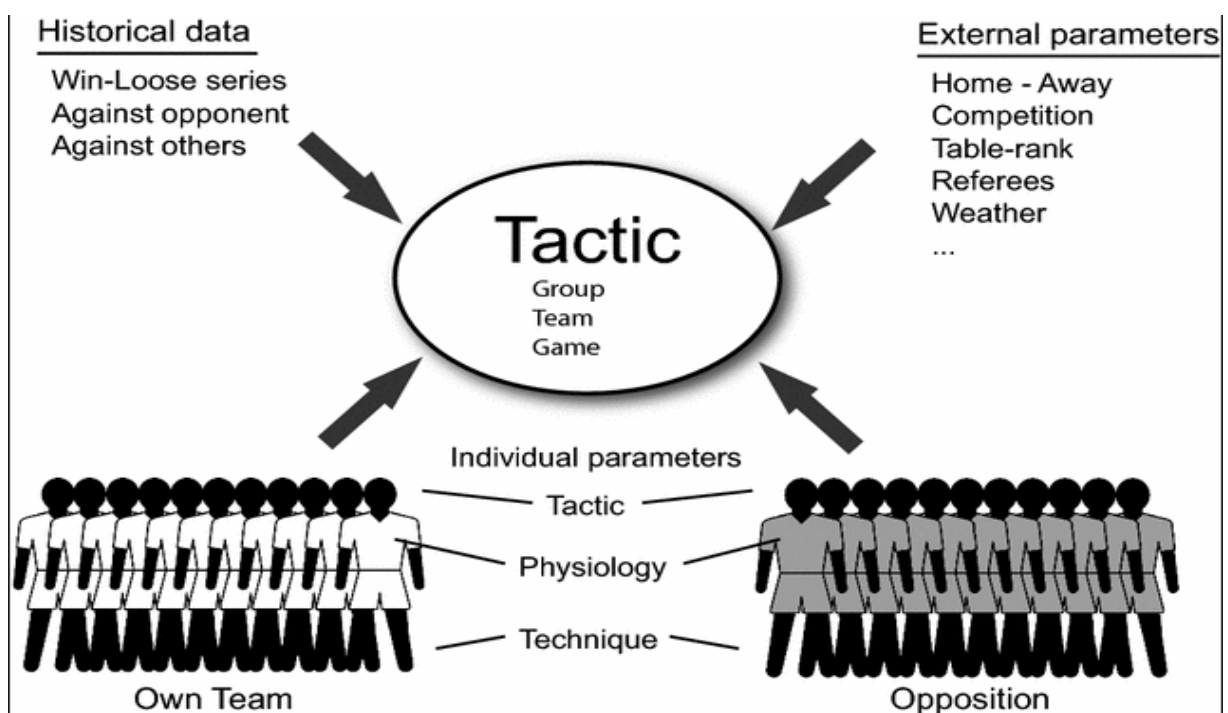


Figure 7. Tactics in football games (Li & Ning, 2017)

Individual v general time-motion analysis and physiological response in 4v4 and 5v5 small-sided soccer game were assessed by Jastrzębski and Radzimiński (2015). In this paper, 13 athletes were selected for testing the running speed. In 4v4 and 5v5 small-sided game, the maximum speed and lactate threshold were used to distinguish the players. The aim of this study from the perspective of exercise physiology was to determine the impact of small-scale competition on athlete performance. Part of the measurement was also area of motion.

Small field confrontation is a prevalent form of football training practice and is useful and can improve the athlete's physical condition and technical ability (Rein & Memmert, 2016). The purpose of the study was to assess and compare the internal load of young football players using HR and perceptual motion (RPE) and to elaborate on the number and the frequency of specific technical skills in 3v3, 4v4 and 5v5 small-sided game. The study showed that a small number of athletes experienced higher internal loads during training. More participants can achieve higher technical skills in quantity and frequency. 3v3 is more effective for high-intensity aerobic training, while 5v5 is more effective for training technical skills. 4v4 is in the middle of the two.

This match starts with the 4v4 competition, but it is based on the number of touches as a reference analysis and judgment, environmental analysis, and analysis to guide the training. The coach must accurately plan the determination of the ball contact rule according to the training objectives. The coach should define the number of balls touches each time. Finally, high-intensity confrontation can be performed simultaneously, and the processing of a ball similar to the technical situation is encountered during the game. According to these results, it is hoped to improve the training load and valuable information will be provided to the coach (Dellal, Lago-Penas, Wong, & Chamari, 2011).

In Sannicandro and Cofano's (2017) study about eight elite men's soccer players from the Premier League Football Academy completed the 4v4 and 8v8 games. After recording their HR during the competition, establishing their primary profile, and evaluating technical actions to determine the physiological response of each athlete to different competitions, the data show that the number of athletes to participate in the competition is not the decisive key. This observation contrasts with more technique-related actions that are affected by the number of athletes.

Effects of pitch size and skill level on tactical behaviors of association football players during small-sided and conditioned games were diagnosed by Dellal (2011). This article

is mainly to test the athletic performance of Under-17 athletes in different environments in small, medium, and large pitches. Based on the changes in the size of the venue, the athlete's trajectory and show more variability in regional level of small and medium players were determined. These findings enhance the understanding of personal tactical behaviors in football and the training design when using pitch size manipulation. According to this experiment, the authors draw the following conclusion:

- Changes in the dimensions of the court and the player's skill and tactical ability will affect their variability. As the game area increases, their action zones become more restricted, indicating a more structured style of play based on specific positioning and game characters (e.g., attacker, defender, right-wing, left-wing).
- Athletes also tend to move more regularly (e.g., periodically) around their positional spatial reference (e.g., trajectory; Dellal, Lago-Penas, Wong, & Chamari, 2011).
- As expected, players with high skill levels are more sensitive to court size manipulation and present a significantly higher difference on the court and have significantly higher variability in the middle and small courts, which means the same scenario constraints can produce different effects depending on the player's competition. Therefore, the impact of the change in size on athletes is still huge. Their scope of activities and tactics are consistent with previous assumptions. This paper uses data arguments to support these arguments.

In summary, the impact of the change in size on athletes is still huge. Their scope of activities and tactics are consistent with previous assumptions. This paper uses data arguments to support these arguments

Fifty SSGs that teach the vital skills of the game were investigated by Jones and Drust (2008). This study summarizes 50 different training techniques in Europe for small-field training.

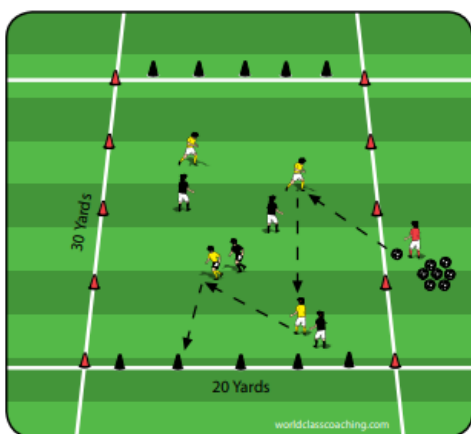
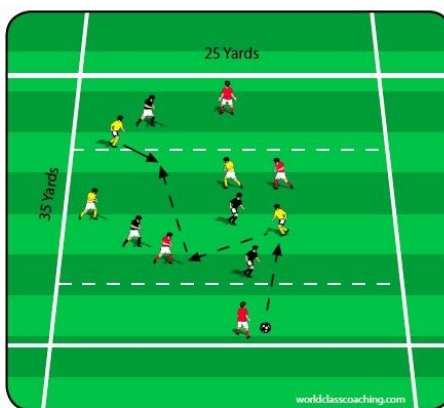
From this coach can choose the training method suitable for 4v4 SSGs, which makes the players more focused and also helps to improve the 4v4 confrontation ability. Different training methods can be described as in the following Figure 8.

4 v 4 + 4 (15 Minutes)

Two teams of four play keep-away with the help of four neutral players. One neutral player is at each end while two neutrals are in the central area.

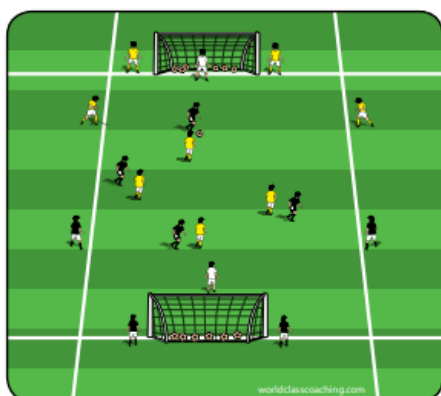
Coaching Points

- Eight passes is worth one point
- Neutral players are only allowed to play one-touch
- Neutral players can not pass to each other
- Restart quickly if the ball goes out of play



Cones as Goals

Use a 20 x 30 yard rectangle set out with marker cones down each side, and pointed target cones along each end. The players are split into two teams, in this case 4 v 4. The two teams then play against each other as normal. But instead of scoring in a goal, the idea is to score by knocking over one of the target cones at the other end of the rectangle. This drill should be used to promote the accuracy of our players shooting and their close range side foot shot.



4 v 4 + 4 Progression

Progression- The grid size is expanded to 44 yards wide (the width of the 18-yard box) by 36 yards long (twice the length of the 18-yard box). Play inside the grid is 4v4 with the same number of support players on the outside. Players don't rotate, though, as they did before. Play for approximately 3 minutes, then switch the players on the inside with the support players on the outside.

Coaching Point

Outside players have 1-touch. All re-starts start with the goalkeeper in the half where the ball went out of bounds.

4 v 4

Two teams of four plus goalkeepers play in an area twice the size of the penalty box. A third team of four players waits outside the area.

The play always starts with one goalkeeper throwing to the other who then plays the ball to his teammates.

The team that scores stays on and plays the team that was off.

Defensive Coaching Points

- Early pressure on the ball
- Cover around the first defender and the ball
- Balance
- Commitment - Desire to win the ball - Desire to defend your goal



Progression #1

The third team now become crossers, one in each corner grid. The attacking team must make four passes before playing the ball to a crossing player. One of the passes MUST be to the goalkeeper.

Defensive Coaching Points

- Pick up a man and get goal side
- Body shape one - see man & ball
- First to the ball - attack the ball
- Defend the goal - priority!
- Be ready for second ball
- Clear your box

Keeper's Coaching Points

- Starting position - related to ball
- Positive body language
- Judge the flight of the cross
- Decision: talk and take control
- Angle of approach and timing



Progression #2

The crossing players now cut the ball back away from the endline, and serve an in-swinging cross with the other foot. The weak side crosser can leave his box and attack the cross.

When the goalkeeper comes to win the ball the defenders should cover around the back of the keeper assuming he will make a mistake.



Figure 8. Training methods in football games (Jones & Drust, 2008)

European football coaches pay special attention to the role of small games in youth training. Because of football awareness, the essential competitive ability in football can only be improved in the SSG environment of offensive and defensive confrontation. Therefore, the training content of each training session should be about 70–80%. In China's youth training, the proportion of training in SSG competitions sometimes only reach 20%, and the proportion of exercises in technique and athleticism is too large, which significantly affects the athlete's awareness of football. At the same time, the technique and the physiological make-up and the game cannot achieve its optimal level. According to the attributes of the game behavior (offensive, defensive, etc.), the balance point of the technical benefit formula is adjusted, and the technical benefit formula of different balance points between 0.4 and 0.65 is constructed. This simplifies the comparison between the technical benefit assessment model and the various game behaviors. At the same time, through case and comprehensive analysis cases, the feasibility of applying technical benefit assessment in training and competition practice is demonstrated (Zhang, Liu, & Hu, 2015)

Small-sided competitions can train young athletes to effectively use their skills and tactics and their ability to escape from pressure of the defensive players on the pitch. Training under the intensity of the game will also gradually adapt to the athlete's body to the load of the official games, and the physical quality will be more suitable for the requirements of the competition. At the same time, through the game the coach can discover the problems and deficiencies of the athletes, enrich the players' experience on the spot, and gradually improve the players' ability to effectively handle the ball in the fierce competition and rationally use the rules of football competition (Jones & Drust, 2008). In summary, football is a sport that relies on the human body to practice. Therefore, we must increase the form of SSG in youth training and recognize the critical role of SSG in football training.

In Germany, the scientific football pyramid structure model consists of four parts (Coerver, 1985):

(1) Ball control: There is no control over the ball lost on the football field. The training of the team regards the ball control ability as the game center;

(2) Releasing and Receiving: After you can use your feet to control the ball anytime and anywhere, the releasing ball of the ball can allow for more active control of the game. The key to releasing the ball is to look up and correct, and to cultivate a creative releasing technical on this basis;

For the receiving, no matter which level of the player the first foot touch is the most critical.

(3) One-on-one offense and defense: Every time, one player attacks with the ball is attached the opponent adds a slot opportunity, which can be used to release the ball or shoot. This is also one reason why training science emphasizes one-on-one attacks. The team members need to exert pressure on the other team's defense. Regardless of 1-1 offense or defense. Coerver emphasizes agile footwork and physical balance, coordination, and other physical qualities;

(4) Speed: The speed meant here is not only the absolute speed in the running but also the speed of acyclic actions, reaction speed, and decision speed when handling the ball. The high level of athletes is reflected in the change of playing in speed. The emphasis on speed in scientific training is fantastic.

The design of the 4v4 competition pitch size and shape is very flexible and can be designed according to the specific situation, such as to improve students' long re-lease or forward attack ability. The site design is from large to a narrow shape.

In order to improve students' short release or ball control ability, so that students can make full use of the width of the venue about the offense, the venue can be designed to be short and wide.

The size of the goal is also important to control the number of goals.

In order to facilitate the comparison, the training methods of China were collected and compared, and the differences between China and Germany were derived from the training methods for 4-4 SSGs.

To allow for a best understanding of the central importance of the 4-4 SSG format in training and the transfer of the 4-4 technical group behavior in competition match play (See Fig.9), in the following aims and principles of the 4-4 small-sided game is explained in more detail.

(1) The basic formation of 4v4 represents the different tactical ideas of the coach. In general, this is similar to Futsal. There are two basic formations: the diamond formation and the 2-2 formation.

(2) In the 2-2 formation, if the releasing line is crossed or released directly, it is easy to be prejudged by the opponent, the coach must encourage more oblique transmission, although the formation is 2-2. However, the coach can explain that the player's position can quickly become a diamond formation, and create more neutrals by running or pulling horizontally.

(a) In the 2-2 formation, the left frontcourt player (Blue 4) opens the offensive width and can not only receive the ball but also pull the defender (red 4) out of the original defensive position;

(b) If the defender (red 4) gives up the defensive position, close to the body (blue 4), then the neutral will appear, (blue 3) can be inserted in the past neutral position, forming a shooting opportunity.

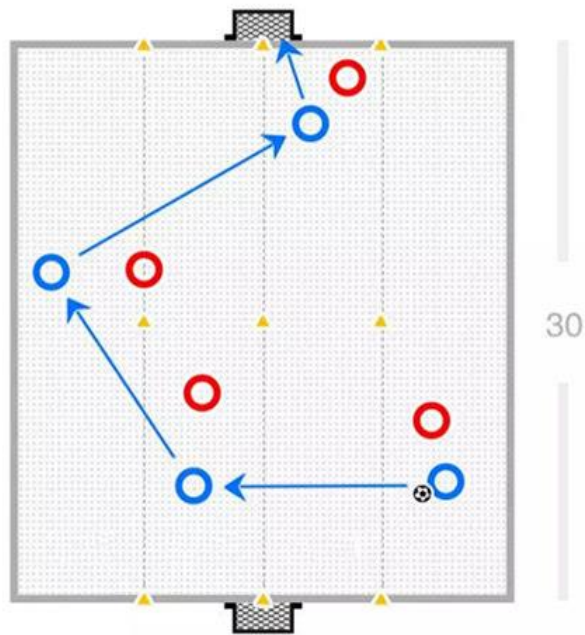


Figure 10. Training designs in the 4-4 formation (Ban, 2016)

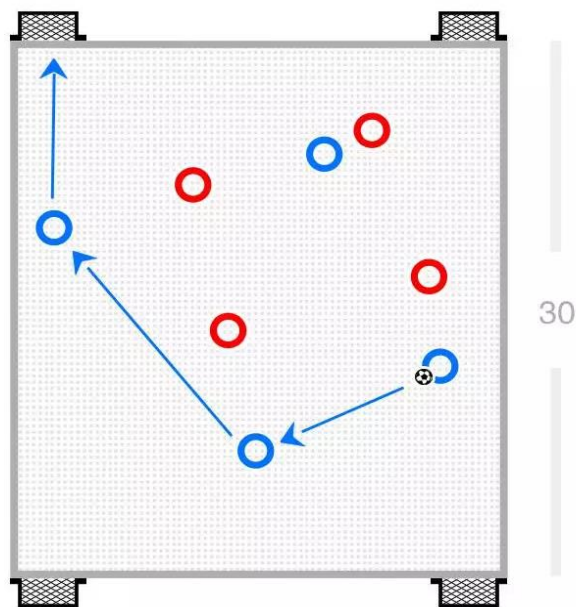


Figure 11. Goal match in the 4-4 formation (Ban, 2016)

Splitting the field vertically, plus two goals, allows the player to more clearly articulate the concept of penetration, offensive width, ball-less, and offensive and defensive transitions.

For example, some of the rule settings in the figure must release the channel one and channel four before attempting to shoot (Ban, 2016).

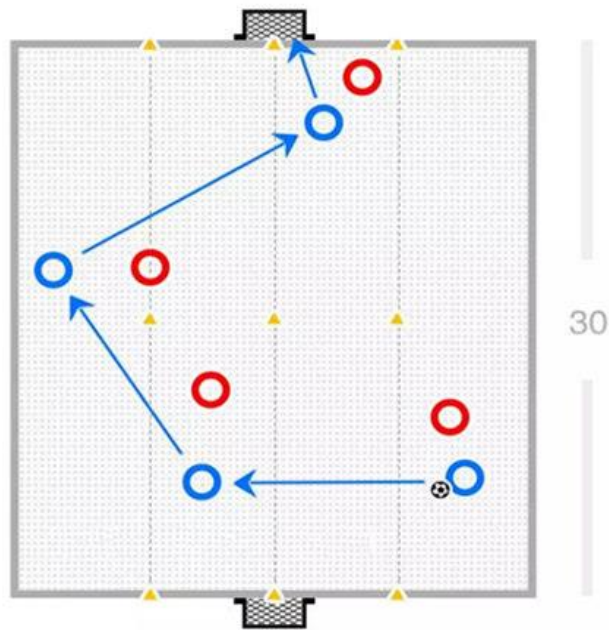


Figure 12. Longitudinal passage in the 4-4 formation (Ban, 2016)

This is another 4v4 training application. Generally, in this part of the conditional game, the bottom line formed by the logo cap represents the goal. The way to score is to take the ball to the bottom line and stop, even if it scores (See Fig.13).

In addition to the offensive training mentioned above, you can also practice the player's game-related dribbling skills and breakthrough.

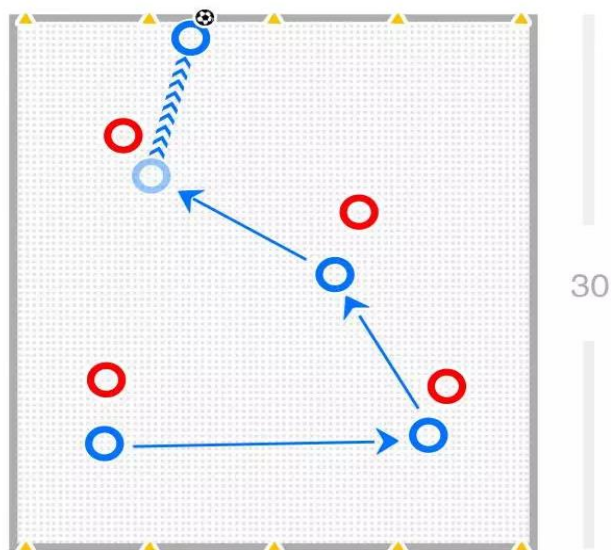


Figure 13. Bottom line score competition in the 4-4 formation (Ban, 2016)

The coach has to make sure that the design of the training class can have not only the player's personal offense but also the overall coordination attack. It is best to have 1v1 and match the scene in each link.

4v4 is a perfect form of teaching, similar to five players. Whether it is for children or professional athletes, whether it is the theme of a training session of your league team or a section of 4v4 small game in a class, one can genuinely understand the teaching points and apply flexibly.

(3) Relevance of small-sided games for the optimization of 11v11-game format

Since the fall of the European Cup in 2004, the German team has been determined to reform, boldly launch newcomers (Guan, 2010), through the training of the two young marshals of Klinsmann and Loew, to achieve the transformation of their technical and tactical play.

In the 2010 World Cup, the German team used the 4-2-3-1 formation as the primary tactical formation, focusing on the balance between offense and defense. Based on ground attack, it is anti-anti-sharp. Although not paying attention to the ball control rate, but the game rhythm is well controlled, and the offensive efficiency is high in line with the trend of modern football offensive tactics. In the offensive, the combination of the side and the middle layer is the main force, with a smooth flow, the offensive means are flexible and diverse, and the rib breaks into the attack point. It reflects the evolution of modern football tactics. Advocating the overall offense, giving full play to the ability of the core offensive group, organizing tactical play around the core offensive group, so that the overall offensive effect of the whole team is optimal

Quick counterattack, fast attack, is an essential offensive method on the football field, which is often called "fast break." After the defending party gets the ball by grabbing, breaking or other means, the other party cannot get out of the way, using the simple medium-long release or fast short-distance advancement or personal quick ball break and other means to hit the ball to the frontcourt with thunder and lightning - the opponent's goal. Quick counterattack is one of the most threatening offensive methods. Suddenly launching counterattacks and effectively organizing offensives is a powerful weapon to destroy the city. However, it is more difficult, that is, to take risks, but also to have accurate and fast transfer and matching skills. In order to be useful in organizing and active, and to cooperate, specialized training must be carried out. Otherwise, it will be challenging to implement in the competition.

Football offensive tactics are common in four offensive tactical forms.

First, the side attack. The sidewalk attack refers to the attack that occurs in the final stage of the offense outside the front line and near the sideline.

There are usually two channels for launching and advancing a side attack:

- (1). The offensive process always follows the sidewalk;
- (2). Transfer to the sidewalk through the middle road.

The main purpose of the offensive game is to make full use of the "width" principle, open the defensive side to weaken the defensive power of the middle road, and create a favorable fighter for the middle road to score. In order to effectively complete the sidewalk attack, the team members should focus on the following five kinds of offensive forms that are favorable for the goal to win:

- (1). The side releases.
- (2). The sidewalk releases horizontally or obliquely and then release through the bottom.

Second, the middle road attack.

The middle road attack usually refers to the attack that occurs in the middle of the front field in the final stage of the offense. The channels formed by the middle road attack generally come from the two forms of direct advancement and intermediate transfer. The offensive characteristics of the middle road are generally more threatening and direct than the side attack. Because the middle road is often defensive, the effectiveness of the offense is difficult, but if it succeeds, the threat is more effective.

There are many ways to end the attack on the middle road. Members are required to master the following common forms:

- (1) Dribble advances in the long-range shot.
- (2) Personal dribble breakthrough shot.
- (3) Local 2 hits 1 and 3 hits 2 quickly with the shot.
- (4) Copy the ball in the ball.
- (5) The fighter is not suitable for the two wings.
- (6) The midfielder plugged in the shot.
- (7) Free kick or match shot

Third, fast counterattack. Counterattack means that the team gets the ball from the defensive as quickly as possible to the mid- and front-court players in a favorable position so that they get a good shot before the opponent has not fully organized the tight defense. There are many opportunities for quick counterattacks in today's football games.

Players must be aware of the timing of the following quick counterattacks:

- (1). Grab the opponent after an inaccurate release.
- (2). Grab the ball under the control of the opponent's foot.
- (3). After the opponent fouled and was sentenced to a free kick.

The most important factor in whether the above opportunities can be fully utilized is whether the "fast" and "quasi" actions can be used reasonably. If you can grasp the moment when the opponent's layout is still in an offensive state, and immediately counterattack, and with the accurate coordination, then this team can probably create a threatening shooting opportunity.

Fourth, the level of attack. The level attack is an offensive way of organizing, step-by-step, and layer-by-layer advancement. It usually occurs when the opponent has organized the defensive arrangement after grabbing the ball from the defense. The level attack is a more cautious offensive style than a fast counterattack. If speed and risk are the basis of counterattack, then it is more appropriate to accurately describe the level of offense. The level attack has the characteristics of stability and accuracy. Generally speaking, only those teams with high skill, tactical literacy, and proper use of the principle of offensive width, penetration, and a good sense of the rhythm of the game can often fully reflect in practice.

It can be seen from the high-level events in recent years that there are mainly four types of offensive methods commonly used by offensive players in the face of defenders.

That is, the individual dribble, breakthrough, match release, and shot.

In the game, the world's best players can not only dribble the ball through the skill line but also control the ball right when the opponent is tight. If the ball is not conducive to continue the ball, the ball can be released to the position at the best time. Better companions in modern football games, the number of players in the fast-moving attack is often the most effective form of attack to form a breakthrough in the local area and form a superiority in number, which helps to improve the quality of the entire attack.

It is well known that Spain is focused on overall cooperation. In the 4-3-3 formation that the team is good at, Fabregas, Iniesta, and Busquets in the midfield position have muscular personal strength, dare to dribble the ball, or release it into the offensive threat zone. In the modern football game, the high-level teams in the Champions League emphasize the combination of the mid-range in the offensive to make full use of the pitch. In the 11v11-format elite players use the full depth and width to mobilize the movement

of the opponent's defensive position, in order to find favorable timing and space, because the front field is in the focus of defense, although the defender cannot give up the defense of the midfield position. In particular, the defensive power of the two side positions is fragile, and the attacker can get rid of the opponent's defensive attack to the front 30 meters through an accelerated sprint or dribbling action. This is the main cause of the speed of play.

In the 4-4-1-1 and 4-2-3-1 formation, a large number of players move with substantial impact in the midfield position, trying to effectively attack the front field through the midfield side, there are many important reasons for the number of dribbles in the midfield side of the team. The midfield position is relatively weak and cannot create a good chance in the midfield.

A one-time shot is good for the player to observe and understand the form on the field more clearly, and the next decision is more precise and transparent when the ball is delivered to his feet. However, the defensive side generally implements man-to-man tactics in areas such as the middle field. The defensive is very dense, and there is minimal leakage. The attack space of the attacking party is further compressed, which is the result of the high pressure of the defense in this area.

Although it is not as good as the front field, the offensive team can control the midfield with high ball possession rate and high release success rate on the field. The offensive team tries to fully mobilize its players to release the ball to the frontcourt area and get the gap in the shot, which shows that the releasing technique has an important impact on the direction of the results of modern football matches.

Club training is too simplistic, and very often lacks scientific foundation, does not grasp the winning rules of football research, and does not show a deep understanding of the load characteristics (Silva, Aguiar, Duarte, Davids, Araújo, & Garganta, 2014). In particular, there is a lack of scientific, objective, and accurate linkage between personal physical fitness and other elements. The rules of youth football development should care for high-intensity and highly competitive small-sided games, and exercises should be arranged with the focus on the core of technique and tactics. In these formats, the re-lease and receive of the ball should be primarily realized by 3v3 and 4v4 small-sided games, so that the training content evokes a high-intensity aerobic training load. The training intensity should vary between 70-79%, 80-89%, and 90-100% mean percentages of the estimated maximum intensity.

Therefore, the selection process of athletes is particularly important. Regional talent screening and sports orientation can be used to make effective predictions for the future success of young football players. Since the general athletic ability test is sensitive during the second year, it is recommended that most children who do not exhibit special abilities choose other more suitable sports (Hohmann, Renye, & Siener, 2019).

Through research and analysis of the 4-4 small-sided game, the concept of the "best area size" of the shot is obtained: the range of the goal line connecting the goal line and the range of the same side goal area within the field and the front of the goal area surrounded by the penalty area is within 30 meters, that is, the penalty area (Zheng, 2012). The inner track and penalty area front area is the main goal score area, especially the area between the goal area and the penalty kick point, reflecting that the area is the offensive and defensive center of each team, and the scoring rate is high, which is the highest number of goals.

Shooting area.

The goals scored in the middle of the road is the most, and the number of goals scored on the side is less, but its role in the game is not less important than the middle attack. In the best shooting area, the number of direct shots accounted for a large proportion of goals scored, and exhibit an upward trend: the number of goals scored by the position attack was the highest, and the proportion of quick counterattacks was increasing gradually. In both modes the optimal release of the ball was the most important feature of all offensive methods.

The scoring actions.

Place kick is also one of the important means in the modern football offensive tactics, other important offensive actions in addition to releasing the ball; personal breakthrough, reshoot and other offensive actions to get the score.

Foreign countries attach great importance to the study of the shooting area. The head of the British Football Training Department, Charlie Hughes, said in the book "Football Tactics and Techniques: "The more important the game, the more equal the two sides of the game are. The more likely the key win a game. Place kick, the fact is that one-third of the goals in the game come from the place kick (Hughes, 1980). These include the number of goals, shooting results, time characteristics, goal areas; research on positioning ball tactics; including free-ball tactics, corner tactics, out-of-bounds tactics; and the use of tactical application games.

The defensive tactics used in today's high-level football team have different performance characteristics in different regions, and the higher the degree of use of in such a region will create a more significant threat to the goal (Wang, 2009). The middle of the backcourt is the area with the most defensive use in the form of a group. Co-defense protection in the game is the main tactic of the use of the ball team's defensive, and the highest success rate, followed by pinch and defensive tactics. It is shown in the form of a group to move to the area with the ball, and the defensive behavior is jointly implemented by two or three people as a defensive unit. In the aftermath of the attack, most of them use the fan-shaped formation to implement the delay tactics.

In the backcourt, the team members use two-man defense tactics. In the middle of the road, the three-person defense tactics are used. The combination of the two is fast, the action is easy to apply, and the most used. The three-person combination is more reasonable in terms and efficiency than the other combinations. Front and rear pinch left, and right pinch are the most common form of sniper tactics used by high-level teams in the middle. It is best to use a parallel pinch on the sideline against the player.

(4) Monitoring of training intensity of small-sided games

In all small-sided game formats training intensity should be carefully monitored. There are two effective ways to measure exercise intensity that is HR monitoring and the Borg 15-point Rating of Perceived Exertion (RPE) that can be used during many football training and competitions. Monitoring by HR is the most direct method of monitoring exercise intensity (Hammann & Erichson, 2006), but this method ignores high-intensity items such as football in a short period. Therefore, the combination of the two, that is, the combination of the training load assessment by means of HR and RPE is the best method.

Contemporary sports scholars and coaches can accurately determine the intensity of football training by measuring HR and PRE in order to apply the best training methods and periodic methods. The results of this study show that human resources are often an effective way to monitor the intensity of training in football matches, but may be limited in shorter, more intense training. Borg 15 RPE seems to be an effective indicator of exercise intensity in a series of football training exercises.

Therefore, when football trainers are using comprehensive techniques and endurance training, training with a moderate number of players may be more appropriate.

3. Research objects and methods

3.1 Research object

The purpose of this study is to explore the 4v4 confrontation scenes that appear in the Under-17 elite youth soccer matches of the German elite soccer club TSG 1899 Hoffenheim, as well as in the U17 team of the Chinese elite soccer club Beijing Guoan. The performance parameters of the different pressure variants faced by players in the 3v3 and 4v4 configurations come from the data collected by the on-site in-stalled video equipment. These data were collected in four pre-selected games of the U17 youth team competition in TSG 1899 Hoffenheim in 2017 and 2018, as well as in two pre-selected U17 competitions collected at the Guoan Club in Beijing, China. Both, the four games chosen from a total of five games of the German youth Bundesliga (1st Division), and two games chosen from the Chinese youth Chinese Football Association Super League (1st Division) were observed on the home base of the resp. clubs. The clubs were selected due to their informed consent and commitment to take part in the study, and because both clubs compete on the highest league-level with the U-17 youth teams in the respective national football league. The concrete six games were pre-selected due to qualitative competition characteristics, like e.g. the intense match character, close game statistics and match result, the high-quality of the observed players' technical and tactical behavior. Furthermore, situational influences played a role for the game selection, like e.g. the actual position of the opponent team in the league table, the representative completeness of the team roster etc. For example, in 2018, due to the World Cup year, some periods of the Chinese competition's calendar had changed. So, at home, the two games pre-selected represented the afore-mentioned criteria in an optimal way. Furthermore, all six video observations in Germany and China were each collected within in two months of the summer season, so that the basic conditional and technical-tactical performance characteristics of the soccer athletes would not change too much. Last, but not least, also the specific environmental influences, like e.g. rain and wet pitch conditions, windy weather etc., that might have an impact either on the quality of the match itself, or also on the quality of the video observation, were of major importance to select these six games (see Table 3) for the final analysis. As all six competitions were observed as home games, it was guaranteed that the video camera was in the same position of the resp. venues, and the video position relative to

the pitch axes did not change.

Table 3. Game details catalog

Age	League	Home team	Away team	score.	date	place
U17	Junior B Bundesliga South / South-west	Hoffenheim	SpVgg Unterhaching	2:1	22.10.2016 11:00	Academy Arena
U17	Junior B Bundesliga South Southwest	Hoffenheim	1.FSV Mainz 05	2:3	08.04.2017 12:00	Academy Arena
U17	Junior B Bundesliga Nord Nordost	Leipzig	Dynamo Dresden	5:0	06.09.2015 13:00	Academy Arena
U17	Junior B Bundesliga Nord Nordost	Leipzig	Hamburger SV	2:1	26.02.2017 11:00	Academy Arena
U17	B-Junior Chinese	Beijing Guoan	Hebei Huaxia	0:3	22.08.2018 9:00	Beijing Xiaowuji
U17	B-Junior Chinese	Beijing Guoan	Beijing Sangao	1:3	19.09.2018 9:00	Beijing Xiaowuji

There were no draws in the matches collected between Germany and China. In order to make the analysis more objective, in the subsequent study, the 80-minute game was

divided into eight parts, each part lasting 10 minutes. The 10 minutes of a tie will be summed up, and a complete match will be built.

3.2 Research method

3.2.1 Literature method

Through the library of Bayreuth University, retrieving books on related football tactics, systematically understand the relevant theories of offensive tactics in modern football competitions, and laid the foundation for the selection of offensive tactical indicators and the determination of statistical scales; through Google Scholar, Weipu The journal network and the Bundesliga official website retrieved the journals, academic reports and graduation thesis of major colleges and universities in terms of offensive tactics, regional offenses and pressures in modern football competitions, and systematically understood the theoretical knowledge and empirical research status of the use of offensive tactics in modern football matches.

3.2.2 Expert interview

Through the combination of personal visits and telephone interviews, the important issues related to the determination of the status and role of offensive tactics in modern football matches were collected. In addition, visited professors, associate professors, and professional club coaches who have long been involved in football teaching and training, to listen carefully to their suggestions and ideas on the core issues associated with this study. Furthermore, conducted research under the guidance of experts in the field, to determine the relevant offensive tactical indicators required for the evaluation of the video technical.

3.2.3 Video observation

According to the research needs, the four games of Hoffenheim and the two games of Beijing were collected, combined with the required statistical indicators, statistical scales, and statistical methods by applying the MATLAB focus on the video frames generated in the game. The procedure is visualized in Figure 1.

To allow for the methods of the data capturing procedures, prior to the video recording of the games the playground in the different stadiums were marked by pylons, and then filmed for video calibration. After the calibration of the pitch the camera could not be

moved anymore and had to remain in a stable position. Next, I received the relevant detailed data and created an Excel form. Finally, use data for further analysis, and to review the data afterward to improve the accuracy of the data and to provide data for the condition of my research.

3.2.4 Mathematical statistics

According to the statistical theory and related knowledge and principles of data processing, the data obtained by video observation is imported into the statistical processing software Stata (Statacorp LLC) for statistical correlation processing. On the data basis, conducted a detailed analysis of the 4v4 situation that occurred on each course. Lastly, developed indicators, and organized the data of the overall sample and variables.

3.2.5 Logic analysis

According to the statistics, the statistical analysis is carried out using the set technical indicators, and the final results and conclusions are obtained by using methods such as induction and comparison.

3.3 Concept and definition of statistical indicators

According to the FIFA tutorial on the division of the field, and considering the opinions of experts and scholars in the field of football, the stadium was divided into three areas: the front field, the midfield, and the backfield (See Fig.14). The bottom line of the offensive direction extends 30 meters into the field. The area within the range is the backfield, and the area where the defensive side bottom line extends to the site within 30 meters is the front field, and the rest is the midfield. Through a literature search, it is found that the front field and the midfield are the most effective offensive areas in modern competitions. This area is the core area for the suppression and anti-suppression of the offensive and defensive sides. In order to improve the comprehensiveness of offensive tactics, this study focuses on this analysis.

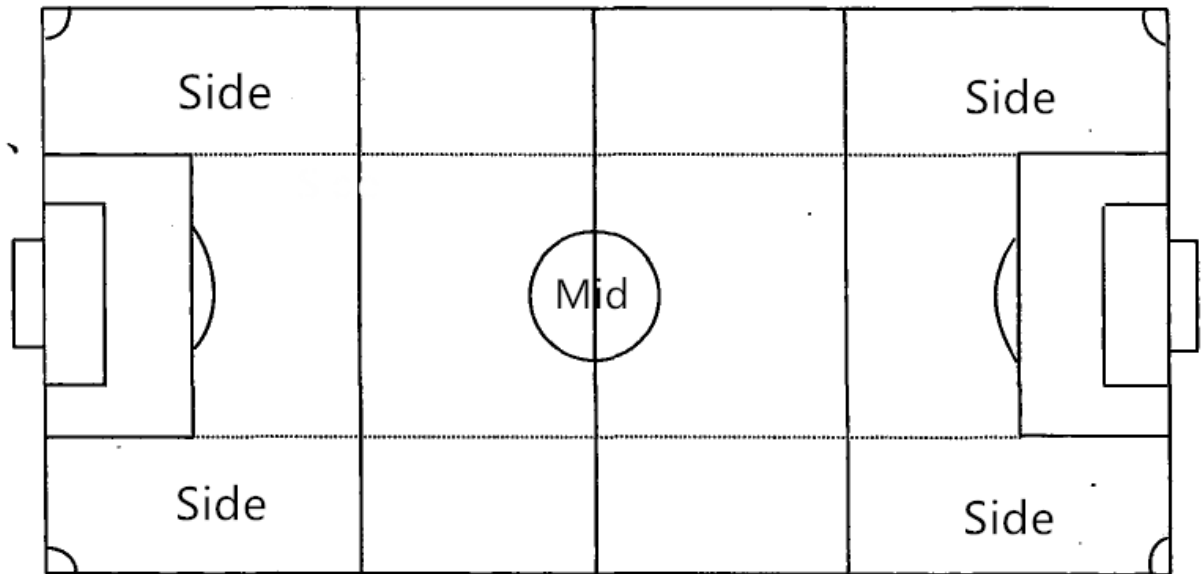


Figure 14. Football field division

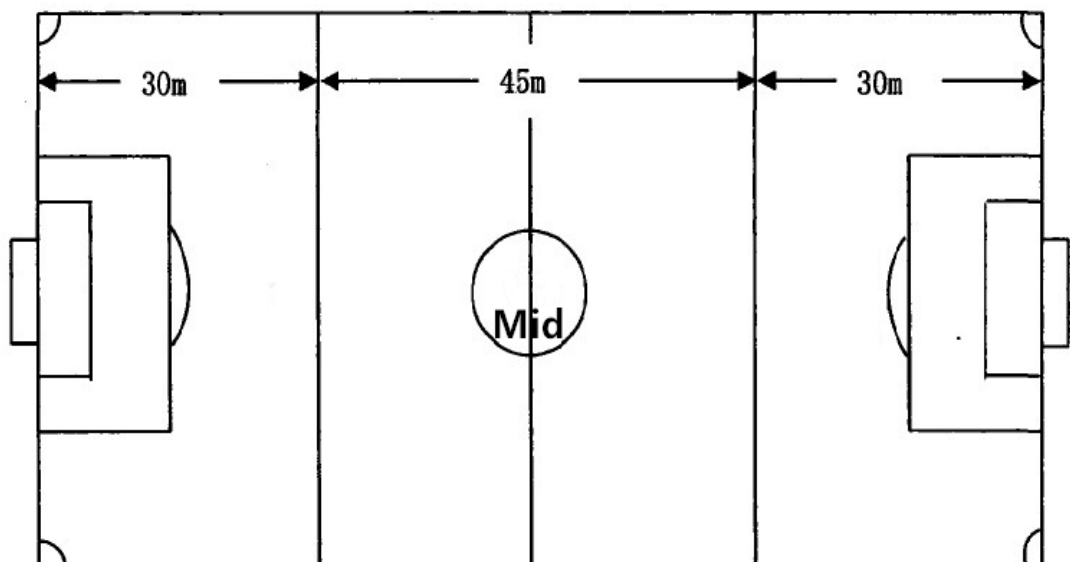


Figure 15. Football field division

Middle road area: the opposite area of the two penalty areas, that is, the area of the penalty line perpendicular to the goal line extending into the field, with a length of 105 meters and a width of 40;

Sidewalk area: an area other than the middle road area, that is, an area outside the penalty line area to the sideline, two areas of 105 meters in length and 14 meters in width (See Fig. 15).

In order to collect the game, we used GoPro cameras, which were statically positioned about 5 meters from the centerline and about 5 meters from the edge of the court.

For later analysis, it is important not to change the camera settings during the entire recording process. So, no panning or zooming of the camera was allowed.

In order to convert the raw data captured into usable image files, it requires technical support from different software:

"Wonder share Filmora" (<https://filmora.wondershare.com/support.html>) and "Defishr1.0" (<https://www.prodad.com/Handycam-Actioncam-Optimierung/DEFISHR-V1-29801,1-de.html>) equalize the original GoPro video, so the typical "fisheye" is no longer visible.

The "GoPro Studio" (<https://gopro.com/help/gopro-studio>) format converts the video file to convert "Mp4" to "AVI" file. In the final step, "Virtual Dub" (www.virtualdub.org/) is used to convert the video file into a separate image file.

In order to be able to infer the actual distance on the football field from the exact proportional distance on the computer, it is necessary to calibrate the material in question. For this purpose, the coordinate system of the image file, including the pixel information, and the coordinate system independently defined on the playing field are linked to each other (See Fig.16). The origin of the custom coordinate system is the starting point

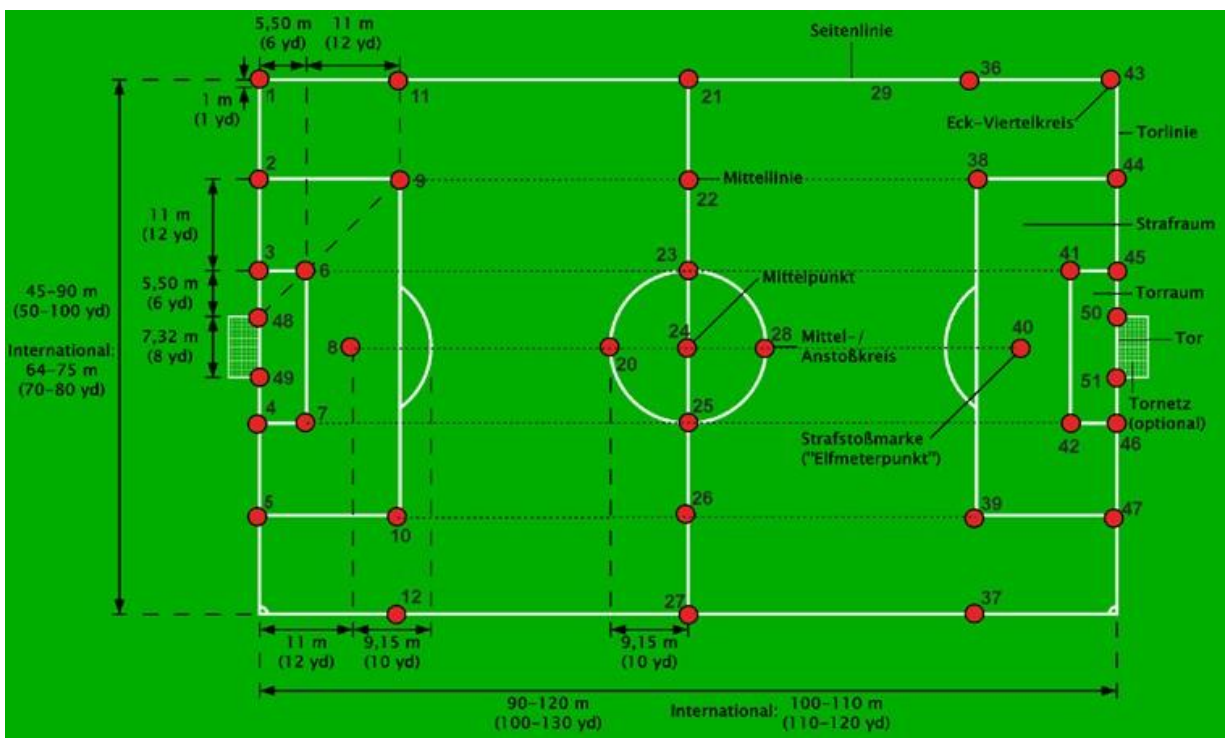


Figure 16. Football field coordinates map (Auerochs, Barthel, Delf, Frei, Reinhard, Weickmann & Winkler, 2017)

All other points must be measured and marked or included by the DFB standard. In this way, the exact position of the player on the spot can be realistically calculated in real-

world coordinates (See Fig.17).



Figure 17. Football match venue placement coordinates (Auerochs, Barthel, Delf, Frei, Reinhard, Weickmann & Winkler, 2017)

To this end, a prospective approach is to use data mining algorithms to analyze the collected data about the game. However, designing this method is not easy, because football matches involve both time and spatial dimensions (Liu, Fournier-Viger, & Hohmann, 2018). The evaluation of the data was carried out using a program written in MATLAB. The program can automatically determine the distance between two points after marking the corresponding surface rectangle surface to stretch, calculate their area, and then transfer to the Excel file (See Fig.18).

In system game observations, distinct features are pre-considered and evaluated. In the current research project, it is distinguished whether the action considered includes a) releasing, b) receiving the ball or c) starting the dribble. It was also pointed out that the action was completed successfully or not successfully. In addition, data on active players is recorded – the player number, location on the pitch and team membership, and time of action. The above rectangular area can be distinguished in three ways: on the one hand, they represent the rectangular area (blue) in which the spherical player with the ball and his three closest players are located. On the other hand, the rectangular area of the four opponents having the shortest distance from the ball possessing player (yellow or green) is determined, to find out, how much pressure is usually applied to the ballplayer. The most frequently considered area of analysis includes the rectangle (yellow or red) where all eight players are located. After recording and collecting all the actions in the Excel file, a large number of data features of empirical research in ball sports such as football can be evaluated.



Figure 18. MATLAB tracks the player's position on the field and calculates the area (Auerochs, Barthel, Delf, Frei, Reinhard, Weickmann & Winkler, 2017)

4. Results

4.1 Descriptive statistics

In this study, a total sample of 18 German and Chinese Youth soccer games was collected in the seasons 2016 to 2018. Out of these games, four German and two Chinese games were selected as representative for the highest German and Chinese 1st division play quality level and used as the source for the data analysis of this study. First, a descriptive analysis of the game observation data was calculated to obtain the basic data, such as the maximum (*MAX*), minimum (*MIN*), average (*M*), standard deviation (*SD*) and standard error (*SE*) (see Table 4-5). These values can be used as essential parameters for different comparisons, and to provide some auxiliary references for more advanced analytical tests.

A total of $N = 4,503$ scenes were observed in the six games, where $n = 3,225$ confrontation scenes were recorded from the German competitions, and $n = 1,278$ confrontation scenes were recorded from the Chinese competitions. In all analysed 3v3 and 4v4 situations two kinds of scenes were classified which were the *receive of the ball* and the *release of the ball* (passing or shooting). As shown in Table 4 and 5, the average values of the areas are smaller in the 4v4 and greater in the 3v3 confrontation situation compared to the recommendations of the German Soccer Federation (Loy, 2006; see above Table 1, p. 13), although a great standard deviation can be seen. Accordingly, the range between the maximum and minimum values is high as the maximum and minimum vary greatly.

Besides the areas, I also calculated the distance between the player with the ball and the nearest defender of the opposing team. This parameter can also be used as a measure of the level of pressure in the game. For the definition of each variable, please, refer to Appendix I at the end of the study.

According to the first three lines of table 4 and table 5, the average values of the three area size variables A_{tot_4v4} , A_{own_4v4} , and A_{opp_4v4} of the overall sample are smaller than recommended by Loy (2006), but greater in the A_{tot_3v3} , A_{own_3v3} , and A_{opp_3v3} analysis of the overall sample. The mean and median values as well as the standard deviation of the distance to the nearest defender indicate a great variation that maybe is caused by some extreme values.

Table 4. Descriptive analysis of all variables of the 4v4 situation in the total sample

	N	Mean	Min	Median	Max	Std
A_tot_4v4 (m ²)	4503	492.23	31.46	442.75	3006.90	274.56
A_own_4v4 (m ²)	4503	299.61	2.78	258.28	2066.84	195.20
A_opp_4v4 (m ²)	4503	244.90	2.74	205.71	2275.07	169.78
Distance (m)	4503	5.22	0	4.07	54.72	3.98

Table 5. Descriptive analysis of all variables of the 3v3 situation in the total sample

	N	Mean	Min	Median	Max	Std
A_tot_3v3 (m ²)	4503	311.81	6.40	263.76	3006.90	213.72
A_own_3v3 (m ²)	4503	149.39	0.39	119.68	1644.40	118.24
A_opp_3v3 (m ²)	4503	144.00	1.14	106.87	1588.30	124.44
Distance (m)	4503	5.22	0	4.07	54.72	3.98

According to the important comparative focus of this study, in the Tables 6-9 separate descriptive statistics for the game behavior data of the Chinese and German 1st division games are provided. In the Chinese sample (Table 6 and 7), the mean and median values of the three *area* variables A_tot_4v4, A_own_4v4, A_opp_4v4, and also the variable *distance to the nearest defender* were relatively smaller.

Table 6. Descriptive analysis of all variables of the 4v4 situation of the Chinese sample

	N	Mean	Min	Median	Max	Std.
A_tot_4v4 (m ²)	1278	434.96	31.46	390.43	1633.36	243.17
A_own_4v4 (m ²)	1278	252.73	3.71	208.00	1210.89	167.92
A_opp_4v4 (m ²)	1278	210.25	2.74	175.05	1247.45	147.88
Distance (m)	1278	4.57	0.37	3.58	30.61	3.55

Table 7. Descriptive analysis of all variables of the 3v3 situation of the Chinese sample

	N	Mean	Min	Median	Max	Std
A_tot_3v3 (m ²)	1278	273.32	6.40	231.32	1400.28	187.96
A_own_3v3 (m ²)	1278	125.94	1.83	98.63	717.67	99.83
A_opp_3v3 (m ²)	1278	121.46	1.14	87.96	1069.44	109.72
Distance (m)	1278	4.57	0.37	3.58	30.61	3.55

Table 8. Descriptive analysis of all variables of the 4v4 situation of the German sample

	N	Mean	Min	Median	Max	Std
A_tot_4v4 (m ²)	3225	514.93	53.89	466.17	3006.90	282.90
A_own_4v4 (m ²)	3225	318.18	2.78	277.08	2066.84	202.05
A_opp_4v4 (m ²)	3225	258.63	8.72	221.26	2275.07	175.85
Distance (m)	3225	5.47	0	4.25	54.72	4.11

Table 9. Descriptive analysis of all variables of the 3v3 situation of the German sample

	N	Mean	Min	Median	Max	Std.
A_tot_3v3 (m ²)	3225	327.06	19.01	280.32	3006.90	221.29
A_own_3v3 (m ²)	3225	158.68	0.39	129.28	1644.40	213.58
A_opp_3v3 (m ²)	3225	152.94	2.12	115.59	1588.31	128.74
Distance (m)	3225	5.47	0	4.25	54.72	4.11

According to the data, the average number of releases per game in the Chinese games was between 600 and 700 passes (including some single shots). In the German games, the average number of releases per game reached a much higher rate of 850 to 1000 passes. More releases mean more off-ball runs. Less released balls mean that the team has fewer balls or there is no good pass route to release the ball successfully to players of the own team. In terms of pressure, in the Chinese games the *area* was smaller than in the German teams, no matter whether the situation takes place in the offensive or the defensive half of the pitch. The drawback is that the players run less, could not create space for teammates, because they player distribution on the field was too dense (see Tables 8 and 9).

Table 10. T-Test for the German-Chinese mean differences for all variables of the 3v3 and 4v4 situations

	GER	CHN	T	P
A_tot_3v3 (m ²)	327.06±221.29	173.32±187.96	8.21	< 0.001
A_own_3v3 (m ²)	158.68±123.58	125.94±99.83	9.25	< 0.001
A_opp_3v3 (m ²)	152.94±128.74	121.46±109.72	8.25	< 0.001

A_tot_4v4 (m ²)	514.93±282.89	434.96±243.17	9.49	< 0.001
A_own_4v4 (m ²)	318.18±202.05	252.73±167.92	11.11	< 0.001
A_opp_4v4 (m ²)	258.63±175.85	210.25±147.88	9.36	< 0.001
Distance (m)	5.47±4.11	4.57±3.55	7.32	< 0.001

It can be seen from table 10 that the *area* of A_tot_3v3 in Germany is 327.06±221.29 m², and the *area* of A_tot_3v3 in China is only 173.32±187.96 m². Accordingly, the T-test for independent samples shows a significant difference ($p < 0.001$), indicating that the *area* covered by the own and opponent players in the 3v3 situation (A_tot_3v3) in the German games was significantly higher than that in the Chinese games, which exhibited a much more compressed game behavior on the playground. All other indicators showed consistent results with this finding (see the Figures 19-21).

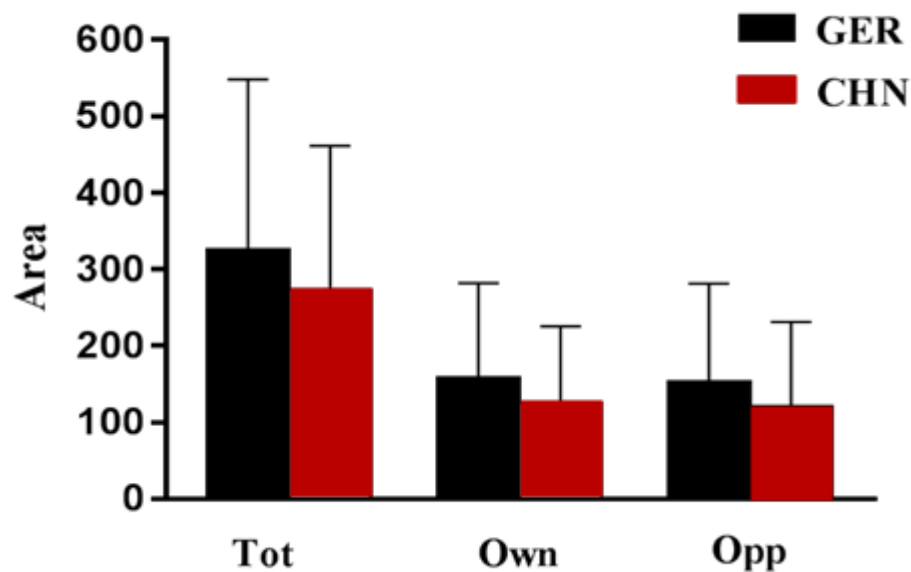


Figure 19. Square Area difference (m²) between Germany and China (3v3)

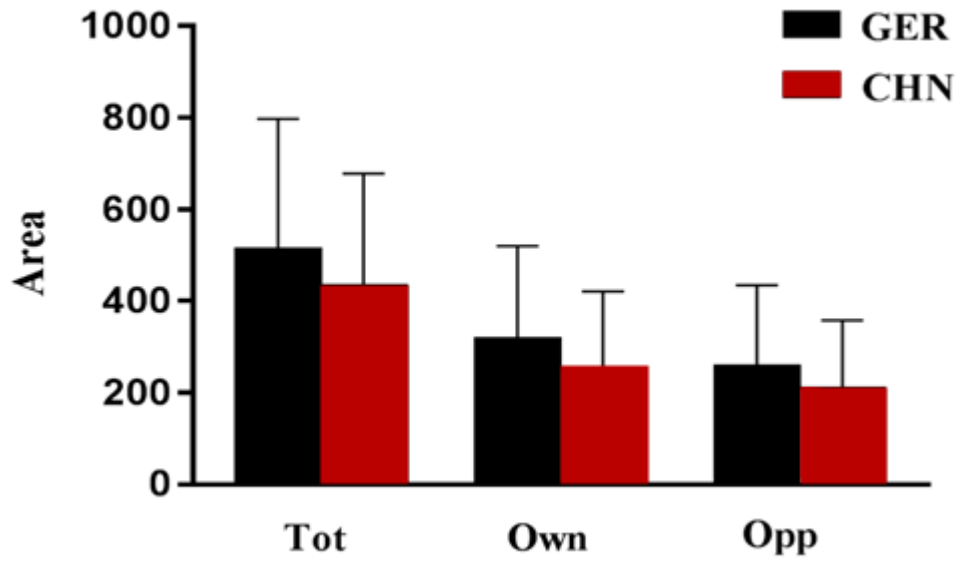


Figure 20. Square Area difference (m²) between Germany and China (4v4)

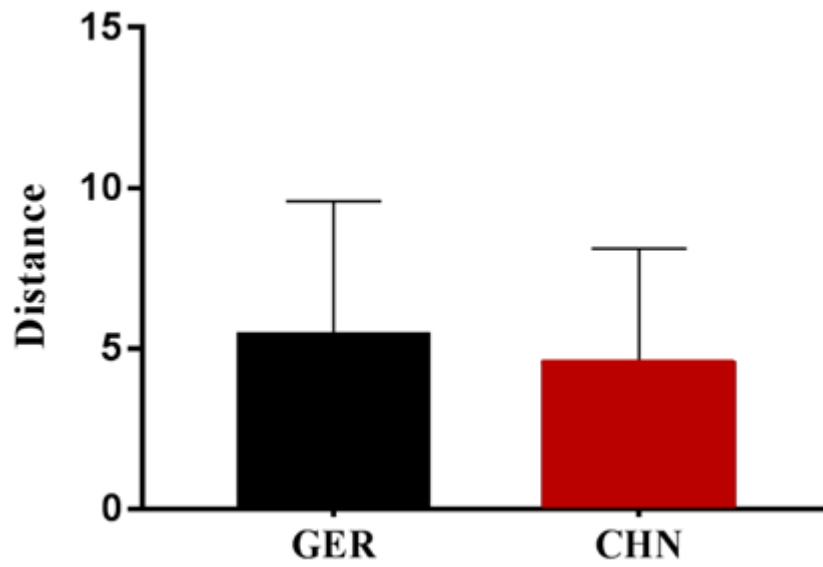


Figure 21. Difference in the distance to the nearest defender (m) between the German and the Chinese samples

4.2 Comparison of the pressure levels between German and Chinese youth soccer

4.2.1 The relationship between competition time and pressure

Especially in the field of competitive team sports, research usually takes place in complex environments, so that mainly field studies strive for a broad external and ecological validity. According to the latest information from literature, the interrelations between different variables or variable sets in team sports exhibit in most cases a nonlinear character (Memmert & Raabe, 2017; Pfeiffer & Hohmann, 2012). In line with such interactive approaches, the pitch *areas* represented by different rectangles covering the space used by various groups of the competing teams in the 3v3 or 4v4 situations on the field, and also the *distance* of the player with the ball to the nearest defender were used as the proxy variables of the game pressure. On the basis of these data, the relationship between the duration of the game and the pressure imposed on the athletes was examined. As shown in Table 11 the duration of the game had a significant impact on various size parameters of the pressure *area* and the *distance* variable. According to the regression results, the relationship between almost all area variables and the advancing competition duration was significant. In the variable A_opp_3v3 the result was $p = 0.97$, that says that the game behavior of the nearest three opposing players to the player with the ball was – at least in the total sample of all games – was independent from the game duration.

Table 11. Regression analysis of the different square areas (m²) of the 4v4 and 3v3 situations and the distance to nearest defender (m) of the total sample of the German and Chinese youth soccer games

Variables	N	R ²	Beta	P
A_tot_4v4 (m ²)	4503	0.01	0.07	0.00
A_own_4v4 (m ²)	4503	0.00	0.06	0.00
A_opp_4v4 (m ²)	4503	0.00	0.02	0.15
A_tot_3v3 (m ²)	4503	0.00	0.04	0.01
A_own_3v3 (m ²)	4503	0.00	0.04	0.02
A_opp_3v3 (m ²)	4503	0.00	0.00	0.97
Distance (m)	4503	0.00	-0.03	0.02

Table 12 and 13 show the correlation between the soccer athletes' pressure on the team with the ball and the duration of the game in regard to the Chinese sample and

the German sample, respectively. In Table 12, the competition time shows a significant relation to the *area* variables in both the 4v4 and the 3v3 situations (A_tot_4v4, A_own_4v4, A_opp_4v4, A_tot_3v3, A_own_3v3, A_opp_3v3), and also in the variable *distance* to the nearest defender ($p < 0.05$).

The regression results in the Chinese sample (see Table 12) are very similar to the total sample regression results, as the *area* covered by the eight athletes of both the competing teams got smaller over the play time. At the same time, also the length of the *distance* to the nearest defender was significantly reduced ($p < 0.05$), indicating that the athletes' pressure on the player with the ball gradually increased over the time course of the Chinese games.

In the German games (see Table 13), only the *area* of the nearest three players of the team without the ball (A_opp_3v3), and the *distance* to the nearest defender decreased significantly with time, whereas all other pressure variables did not exhibit significant differences over the different stages of the games. This result can be regarded as a sign of a better team distribution on the pitch in German youth soccer.

In order to be more clear about the variation of each variable along the game duration, and to allow for the inspection of potential differences between the Chinese and German samples, the Figures 22–27 contain scatter grams. The abscissa (time) represents the duration of the game, and the ordinate is the distance between the player and the nearest defender (distance) or the areas formed by three or four athletes (area) of the competing teams.

Throughout the game, the value of the *distance* showed a wave-shaped change, but the waveform gradually became smaller, indicating that there was a dynamic game relationship between the players with the ball and the nearest defenders throughout the game. As time went by in the course of the games, the waves tended to flatten. Maybe, the players with the ball and the nearest defenders optimized their interrelated positions, so that the tension between the teams were rising step-by-step.

Table 12. Regression analysis of the different square areas (m²) of the 4v4 and 3v3 situations and the distance to nearest defender (m) of the Chinese sample

Variables	N	R ²	Beta	P
A_tot_4v4 (m ²)	1278	0.03	0.17	0.00
A_own_4v4 (m ²)	1278	0.04	0.19	0.00
A_opp_4v4 (m ²)	1278	0.01	0.10	0.00
A_tot_3v3 (m ²)	1278	0.02	0.15	0.00

A_own_3v3 (m ²)	1278	0.03	0.18	0.00
A_opp_3v3 (m ²)	1278	0.01	0.10	0.00
Distance (m)	1278	0.01	0.11	0.00

Table 13. Regression analysis of the different square areas (m²) of the 4v4 and 3v3 situations and the distance to nearest defender (m) of the German sample

Variables	N	R ²	Beta	P
A_tot_4v4 (m ²)	3225	0.00	0.03	0.08
A_own_4v4 (m ²)	3225	0.00	0.01	0.62
A_opp_4v4 (m ²)	3225	0.00	-0.01	0.45
A_tot_3v3 (m ²)	3225	0.00	-0.00	0.85
A_own_3v3 (m ²)	3225	0.00	-0.02	0.33
A_opp_3v3 (m ²)	3225	0.00	-0.04	0.03
Distance (m)	3225	0.01	-0.09	0.00

The following graphs show the relationship between the duration of the games and the area formed by the athletes in the overall sample, the Chinese sample, and the German sample. In the overall sample, as game time prolonged, the *area* size in the 4v4 situation (A_tot_4v4, A_own_4v4, and A_opp_4v4) showed a relatively flat upward trend, meaning that the pressure on the observed group of three or four athletes of the team with the ball increased gradually. However, in the German sample, only two variables (A_opp_3v3 and the *distance* to the nearest defender) showed significant differences over the time course of the games, whereas all other variables did not change significantly over the game time.

Comparing the Chinese and German samples, there is a significant difference in the *area* size of the observed player groups of three or four athletes. In the Chinese sample, as the game time progressed, the values of the three area variables in the 4v4 situation increased significantly ($p < 0.05$). Especially in the second half, the values of A_tot_4v4, A_own_4v4, and A_opp_4v4 increased rapidly, and the game moved into the most intense stage. However, in the German sample, the area of the athlete's group formation was slightly reduced one quarter before the end of the game. This may be caused by tactical differences between the Chinese and German teams.

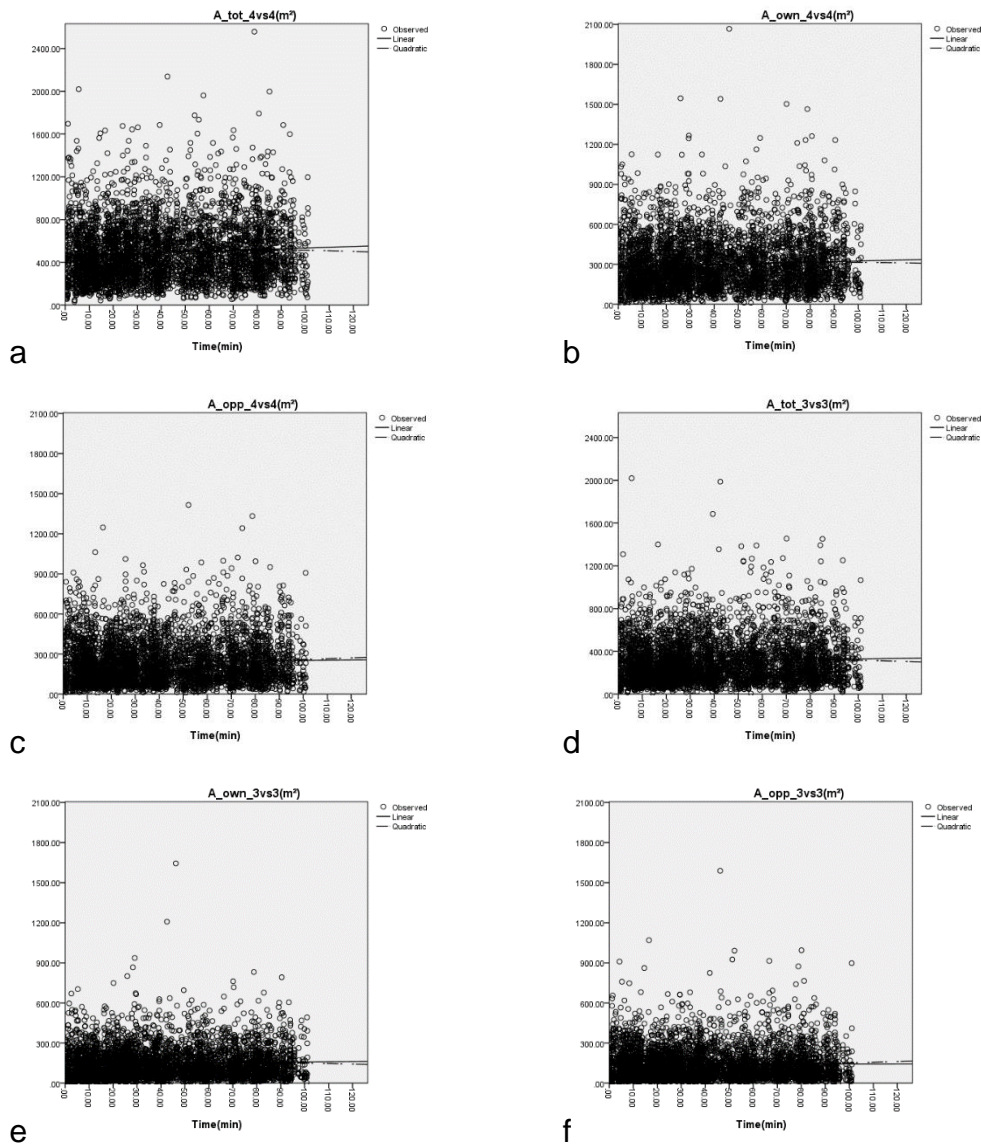


Figure 22. (a-f) The relationship between the different square areas (m²) of the 4v4 and 3v3 situations and the game duration (min) of the total sample

As can be seen from Figure 22 (a-f), when the game time is taken as the independent variable and the whole sample ($N = 4503$) was investigated by means of regression analysis, in almost all analysis the game duration exerted a significant influence on the game pressure areas ($p < 0.05$). Only when the nearest three defenders around the player with the ball were observed, and the area size of the variable A_{opp_3v3} was used as the dependent variable for regression analysis, the game duration did not have a significant influence on the pressure on the player with the ball ($p > 0.05$) (See Appendix 2 for details).

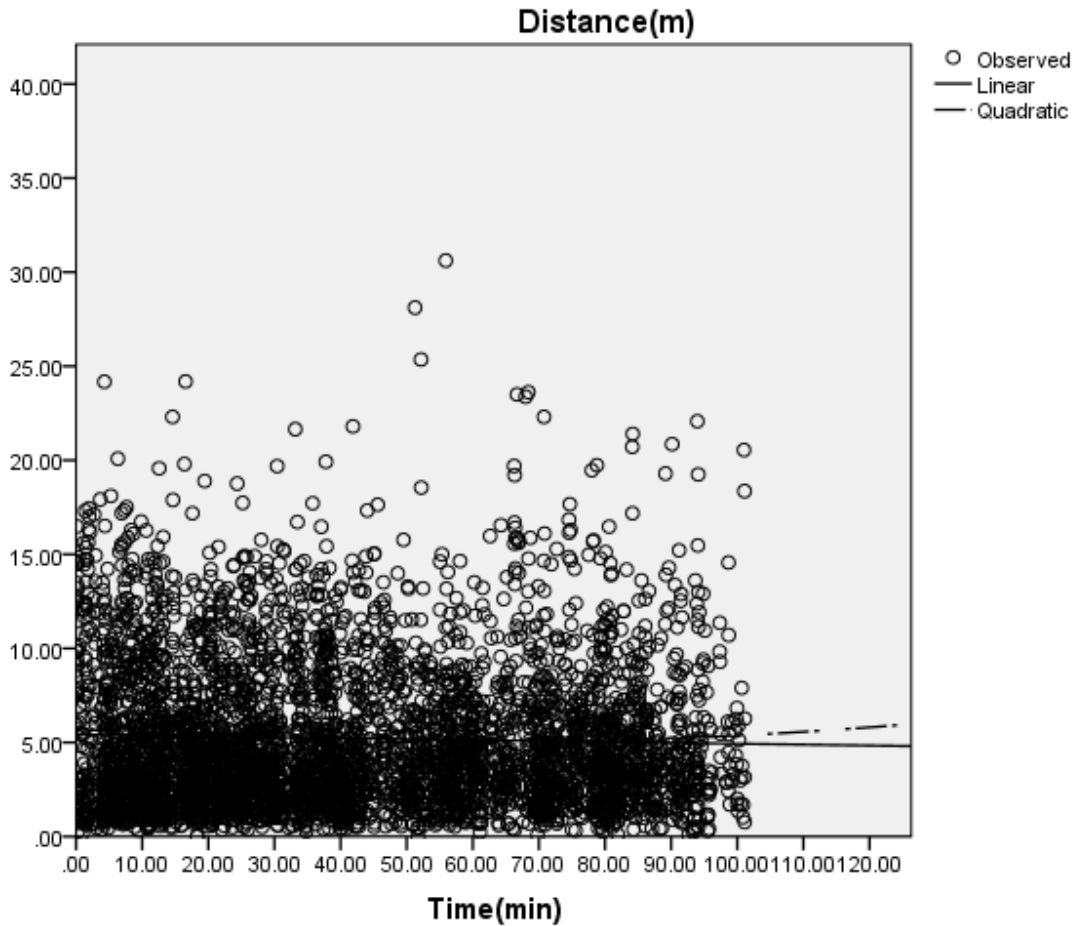


Figure 23. The relationship between the distance to the nearest defender (m) and the game duration (min) of the total sample

As can be seen in Figure 23, also when the *distance* between the player with the ball and the nearest defender was taken as dependent variable, in the total sample ($N = 4503$) the game duration exerted a significant influence on the distance between these two players ($p < 0.05$).

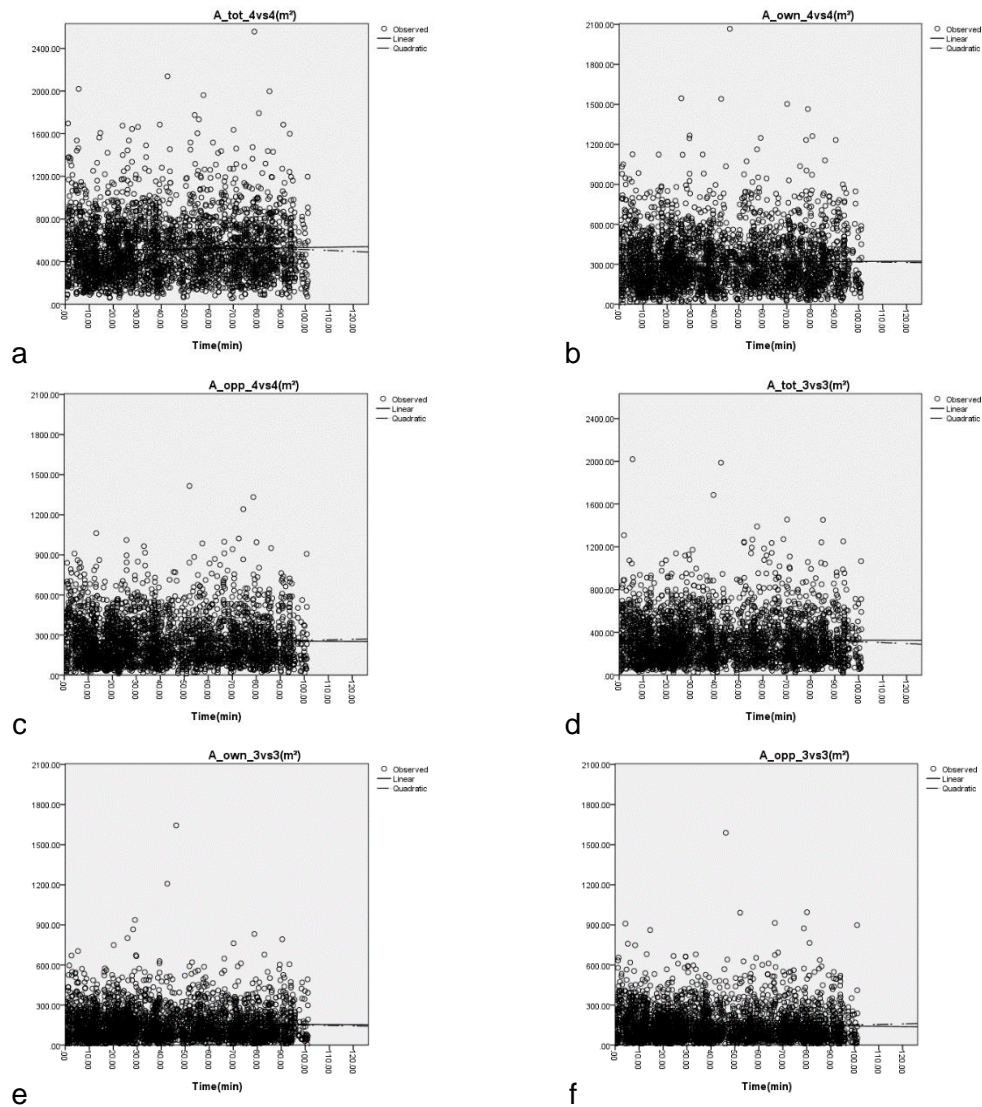


Figure 24. (a-f) The relationship between the different square areas (m²) of the 4v4 and 3v3 situations and the game duration (min) of the German sample

If only the German games were analysed separately (see Figure 24, a-f; $n = 3225$), the game duration did not lead to a significant influence on the *areas* of distribution of the nearest three own and the nearest four opponent players (A_{tot_4v4} ; $p > 0.05$). This result can also be found in almost all the other pressure variables in the 4v4 and 3v3 situation (A_{own_4v4} , A_{opp_4v4} , A_{tot_3v3} , A_{own_3v3}). Only when the game behavior of the nearest three opponent players (A_{opp_3v3}) was used as the dependent variable for regression analysis, the results showed a significant influence of the game duration and the pitch area covered by the group of the defending players ($p < 0.05$).

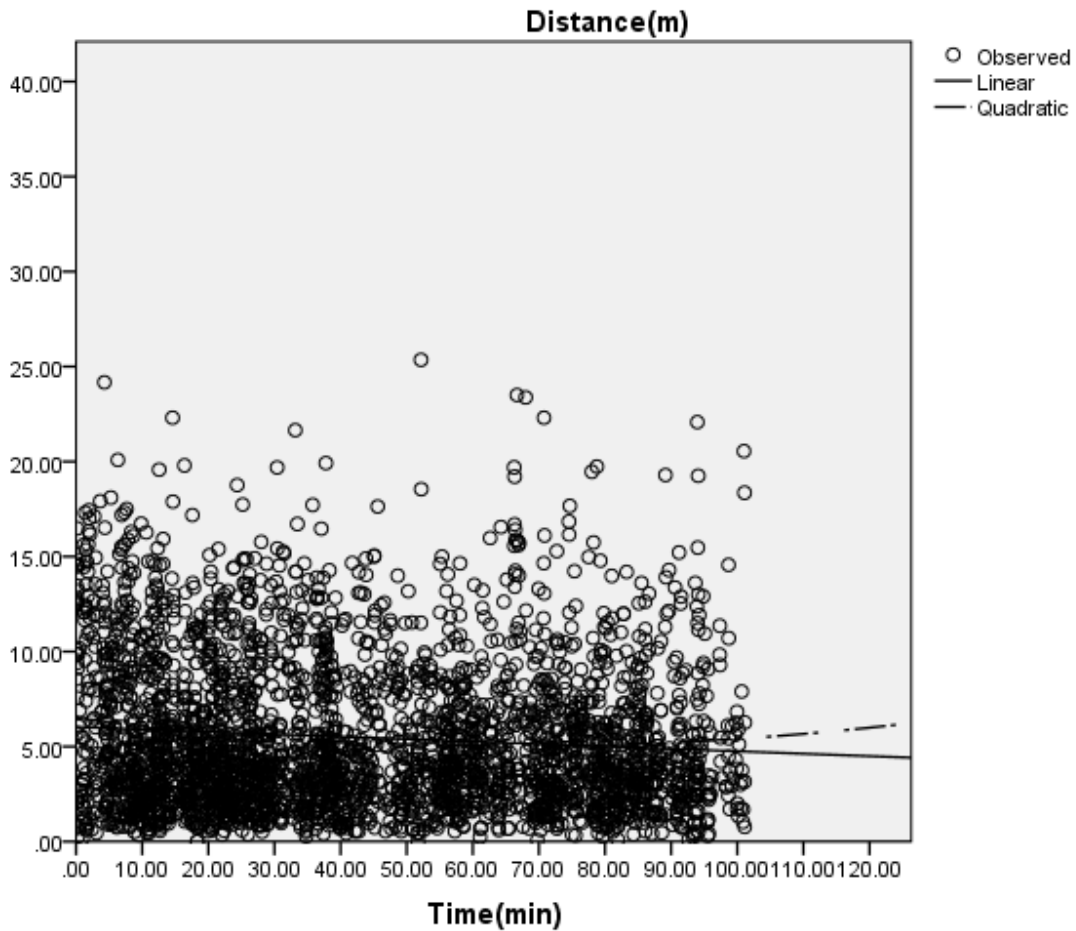


Figure 25. The relationship between the distance to the nearest defender (m) and the game duration (min) of the German sample

As can be seen from Figure 25, in the German games ($n = 3225$), also the *distance* of the player with the ball to the next single defender is related significantly to the game duration ($p < 0.05$), as the pressure on the player with the ball became higher over the time course of the games.

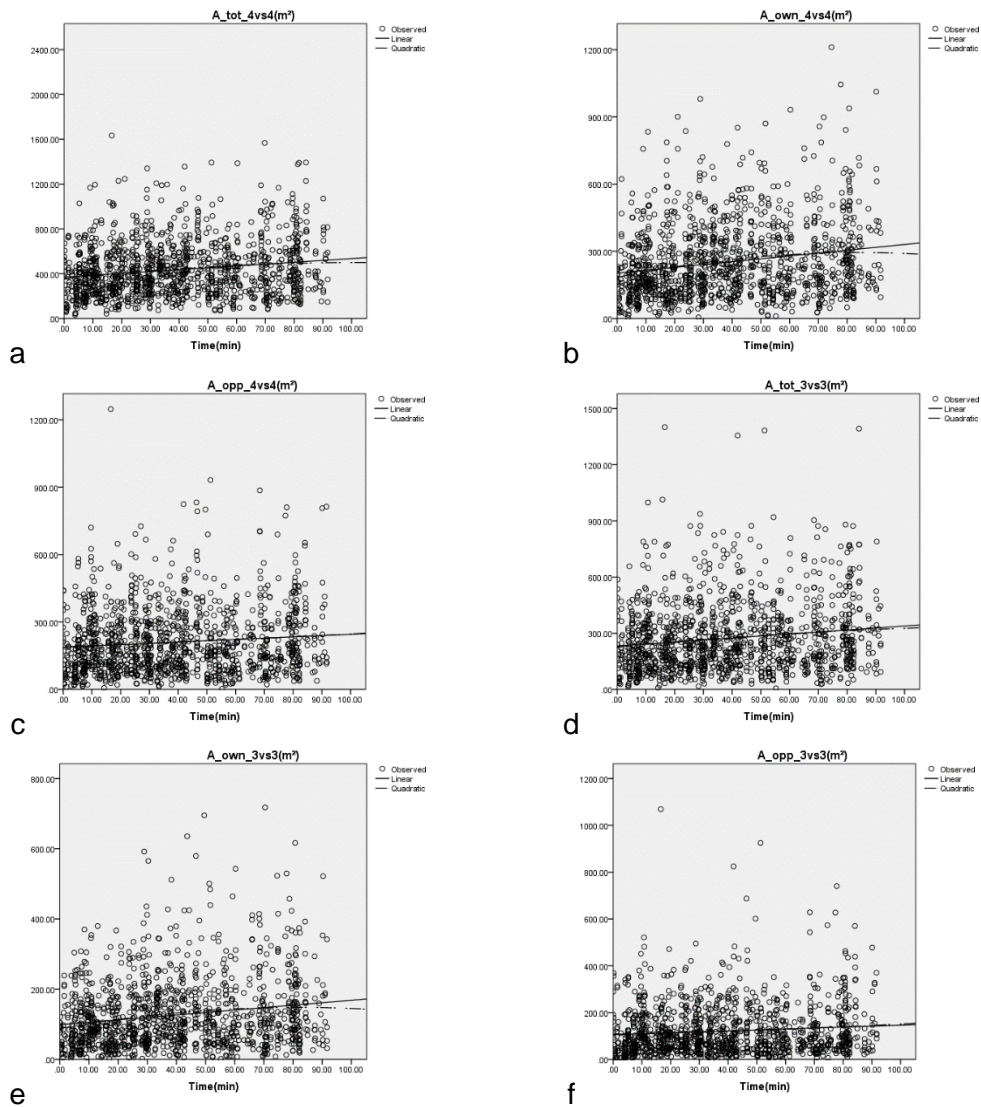


Figure 26. (a-f) The relationship between the different square areas (m^2) of the 4v4 and 3v3 situations and the game duration (min) of the Chinese sample

As can be seen from Figure 26 (a-f), in the Chinese games ($N = 1278$), the game duration had a significant influence ($p < 0.05$) on all different pitch area sizes investigated in the 4v4 and 3v3 situations (A_{tot_4v4} , A_{own_4v4} , A_{opp_4v4} , A_{tot_3v3} , A_{own_3v3} , A_{opp_3v3}).

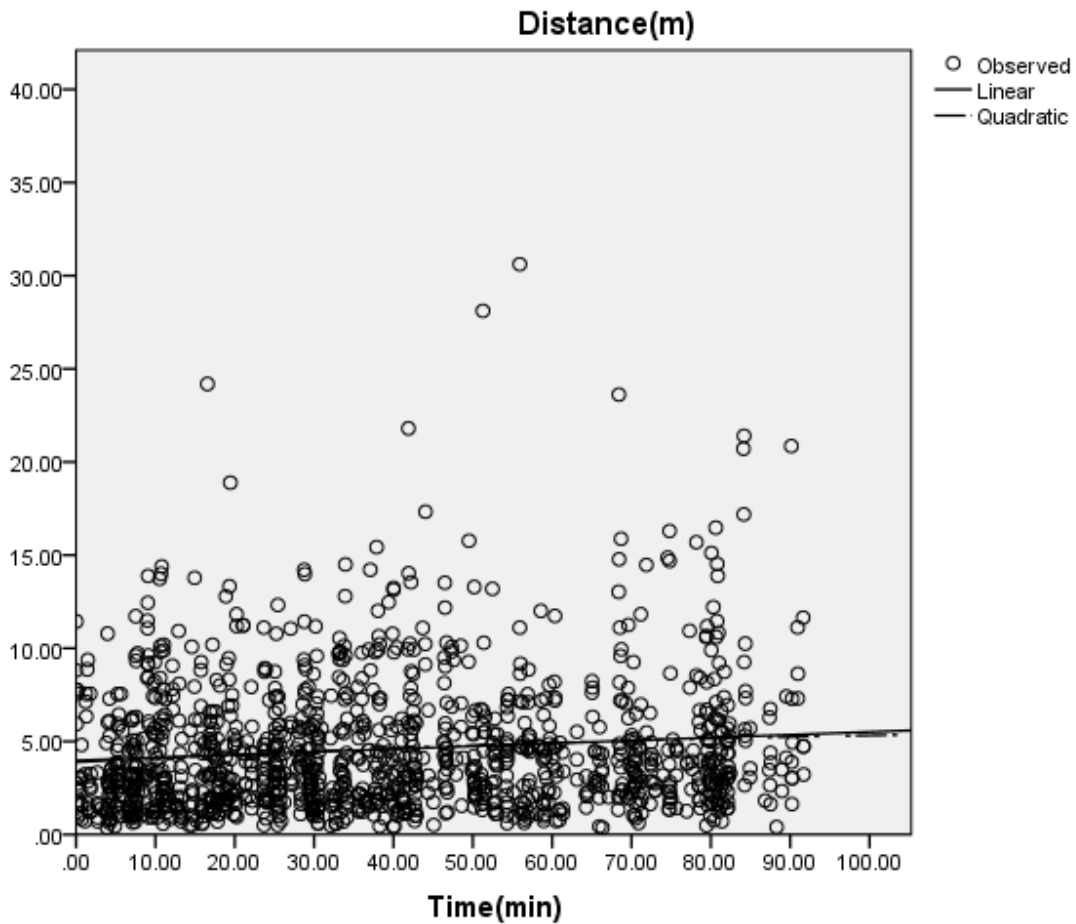


Figure 27. The relationship between the distance to the nearest defender (m) and the game duration (min) of the Chinese sample

As can be seen from Figure 27, in the Chinese u17 youth soccer games the distance of the player with the ball to the nearest defender is also significantly ($p < 0.05$) related to the game duration.

4.2.2 The relationship between the actual score and the pressure

To study the differences between the German and Chinese U17 youth soccer games in regard to the different scores of the games, an analysis of variance (ANOVA) was calculated for all pressure variables of the 4v4 and 3v3 situations on the pitch (A_tot_4v4, A_own_4v4, A_opp_4v4, A_tot_3v3, A_own_3v3, A_opp_3v3, and the distance to the nearest defender). The scores were differentiated as lead score, tie score, and behind score according to the actual goal difference. Accordingly, three groups were formed. The group behind (G₋₁) comprises all situations when the own score was negative, that is the goal difference was less than zero ($\Delta \leq -1$). Group tie (G₀) comprises all situations taking place when the score was actually a tie ($\Delta = 0$). Thirdly, the group lead (G₁) comprises all situations when the own score was positive, that is the goal difference was more than zero ($\Delta \geq 1$). In this part of the study, we hypothesized that the pressure is different when the score is a lead, tie, or behind. To proof this assumption, the significance level was set at $p = 0.05$.

In table 14, the results of the ANOVAs are presented. It can be seen that there was a big difference between the three score groups. Therefore, the hypothesis that the pressure is highest at a score difference of zero did not hold true. So, in most of the investigated pressure variables of the 4v4 and 3v3 situation the pressure was highest in the behind and tie situation, whereas the pressure on the own team was lower when being in lead (See Appendix 3 for details).

Table 14. Analysis of all pressure variables according to the actual game score

14.1: A_tot_4v4 (N=4503)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	457.21	250.68	8.43		0.62	0.00
Tie	1164	463.20	256.91	7.53	0.62		0.00
Lead	2454	518.64	287.88	5.81	0.00	0.00	
Total	4503	492.23	274.56	4.09			

14.2: A_own_4v4 (N=4503)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	276.98	177.03	5.95		0.76	0.00
Tie	1164	279.59	185.05	5.42	0.76		0.00

Lead	2454	317.26	204.24	4.12	0.00	0.00
Total	4503	299.61	195.20	2.91		

14.3: A_opp_4v4 (N=4503)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	231.36	158.45	5.33		0.89	0.00
Tie	1164	232.43	161.38	4.73	0.89		0.00
Lead	2454	255.70	176.77	3.57	0.00	0.00	
Total	4503	244.90	169.78	2.53			

14.4: A_tot_3v3 (N=4503)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	287.95	189.48	6.37		0.42	0.00
Tie	1164	295.57	202.23	5.93	0.42		0.00
Lead	2454	328.11	225.62	4.56	0.00	0.00	
Total	4503	311.81	213.72	3.18			

14.5: A_own_3v3 (N=4503)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	137.06	105.01	3.53		0.84	0.00
Tie	1164	138.13	110.95	3.25	0.84		0.00
Lead	2454	159.18	125.06	2.52	0.00	0.00	
Total	4503	149.39	118.24	1.76			

14.6: A_opp_3v3 (N=4503)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	135.86	118.76	3.99		0.65	0.01
Tie	1164	138.34	118.44	3.47	0.65		0.01
Lead	2454	149.63	128.90	2.60	0.01	0.01	
Total	4503	144.00	124.44	1.85			

14.7: A_tot_4v4 (N=3225)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	468.49	273.94	24.50		0.52	0.02
Tie	965	485.93	261.27	8.41	0.52		0.00
Lead	2135	530.75	291.47	6.31	0.02	0.00	
Total	3225	514.93	282.90	4.98			

14.8: A_own_4v4 (N=3225)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	294.68	180.81	16.17		0.87	0.07
Tie	965	297.79	189.84	6.11	0.87		0.00
Lead	2135	328.78	207.75	4.50	0.07	0.00	
Total	3225	318.18	202.05	3.56			

14.9: A_opp_4v4 (N=3225)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	248.78	173.33	15.50		0.92	0.33
Tie	965	246.98	165.46	5.33	0.92		0.01
Lead	2135	264.47	180.29	3.90	0.33	0.01	
Total	3225	258.63	175.85	3.10			

14.10: A_tot_3v3 (N=3225)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	285.19	188.16	16.83		0.21	0.01
Tie	965	311.42	208.37	6.71	0.21		0.00
Lead	2135	336.58	228.05	4.94	0.01	0.00	
Total	3225	327.06	221.29	3.90			

14.11: A_own_3v3 (N=3225)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	137.57	104.80	9.37		0.41	0.02
Tie	965	147.17	114.91	3.70	0.41		0.00
Lead	2135	165.13	127.83	2.77	0.02	0.00	
Total	3225	158.68	123.58	2.18			

14.12: A_opp_3v3 (N=3225)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	141.64	111.53	9.98		0.62	0.23
Tie	965	147.77	122.46	3.94	0.62		0.10
Lead	2135	155.93	132.35	2.86	0.23	0.10	
Total	3225	152.94	128.74	2.27			

14.13: A_tot_4v4 (N=1278)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	760	455.35	246.79	8.95		0.00	0.27
Tie	199	352.95	201.50	14.28	0.00		0.00

Lead	319	437.54	248.17	13.90	0.27	0.00
Total	1278	434.96	243.17	6.80		

14.14: A_own_4v4 (N=1278)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	760	274.06	176.35	6.40		0.00	0.00
Tie	199	191.38	127.47	9.04	0.00		0.00
Lead	319	240.18	159.03	8.90	0.00	0.00	
Total	1278	252.73	167.92	4.70			

14.15: A_opp_4v4 (N=1278)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	760	228.49	155.80	5.65		0.00	0.00
Tie	199	161.85	116.83	8.28	0.00		0.01
Lead	319	196.98	137.63	7.71	0.00	0.01	
Total	1278	210.25	147.88	4.14			

14.16: A_tot_3v3 (N=1278)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	760	288.40	189.81	6.89		0.00	0.17
Tie	199	218.73	147.26	10.44	0.00		0.00
Lead	319	271.43	199.91	11.19	0.17	0.00	
Total	1278	273.32	187.96	5.26			

14.17: A_own_3v3 (N=1278)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	760	136.97	105.12	3.81		0.00	0.01
Tie	199	94.33	75.41	5.35	0.00		0.01
Lead	319	119.38	95.66	5.36	0.01	0.01	
Total	1278	125.94	99.83	2.79			

14.18: A_opp_3v3 (N=1278)

Group	N	M (m ²)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	760	134.91	119.96	4.35		0.00	0.00
Tie	199	92.62	82.75	5.87	0.00		0.13
Lead	319	107.42	92.64	5.19	0.00	0.13	
Total	1278	121.46	109.72	3.07			

For different game scores, the scatter grams in the following figures visually display the mean of the main pressure variables in each of the different game score conditions. So, as shown in Figure 28 (a-f), when the total sample of the games was analysed ($N = 4,503$), in all variables represented by the different area sizes on the pitch (A_{tot_4v4} , A_{own_4v4} , A_{opp_4v4} , A_{tot_3v3} , A_{own_3v3} , A_{opp_3v3}) there was no systematic difference between behind and tie, but of course between the score behind and lead ($p < 0.05$), and also between the tie and the lead standing ($p < 0.05$).

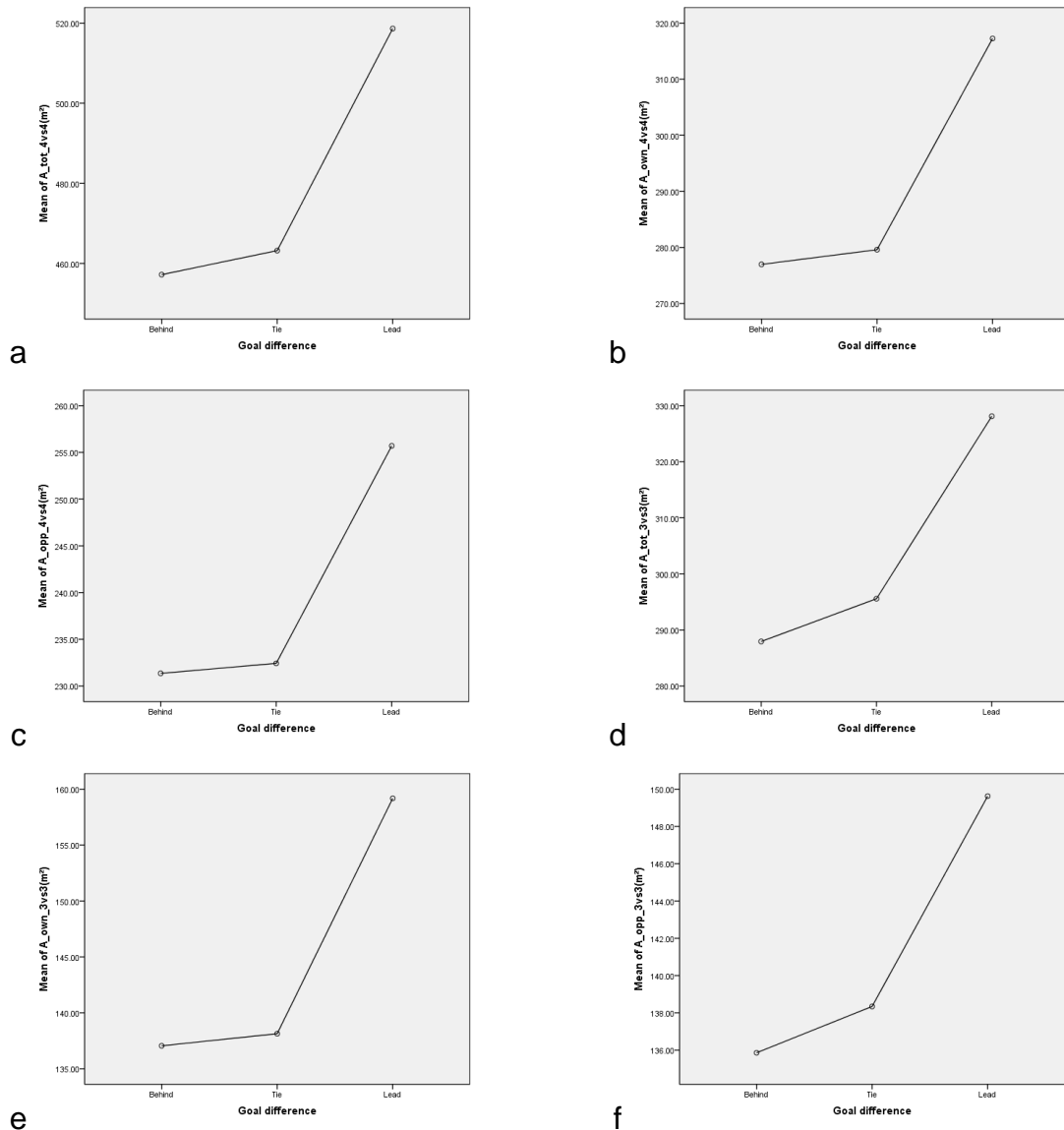


Figure 28. (a-f) The relationship between the pressure variables and the actual game score ($N = 4,503$)

As shown in Table 15, and also in Figure 29, in the total sample of the U17 youth soccer games, the more elementary variable distance between the player with the ball and the

nearest defender neither did not significantly vary different between the behind and the tie score, nor did a difference occur between the lead and the tie score. Only, the players with the ball of the teams that were in lead faced a lower pressure of the next opponent player during the games ($p < 0.05$)

Table 15. The relationship between the three game score situations (behind, tie, lead) and the different distances to the nearest defender (m) of the total sample (N=4503)

	N	Mean (m)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	885	4.89	3.72	0.13		0.18	0.00
Tie	1164	5.13	3.99	0.17	0.18		0.07
Lead	2454	5.38	4.06	0.08	0.00	0.07	
Total	4503	5.22	3.98	0.06			

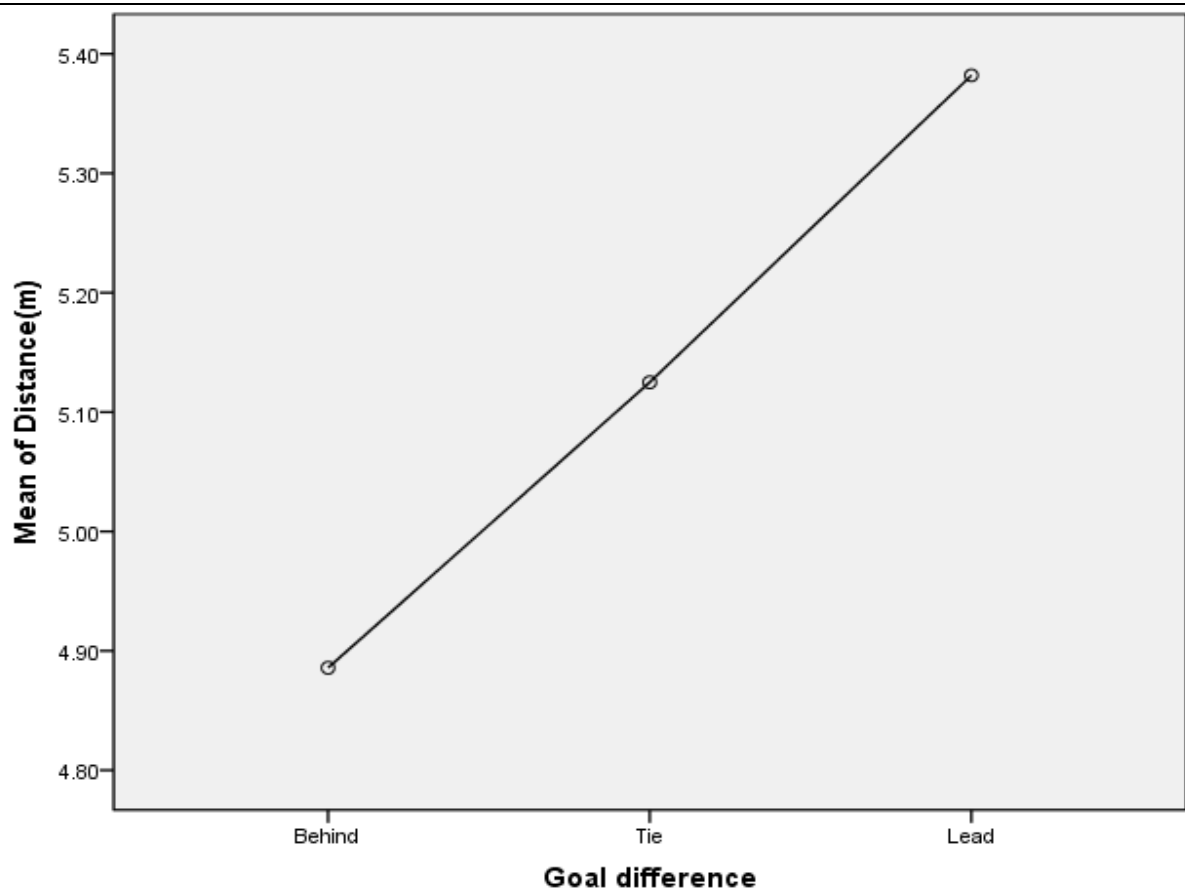


Figure 29. The relationship between the three game score situations (behind, tie, lead) and the different distances to the nearest defender (m) of the total sample (N=4503)

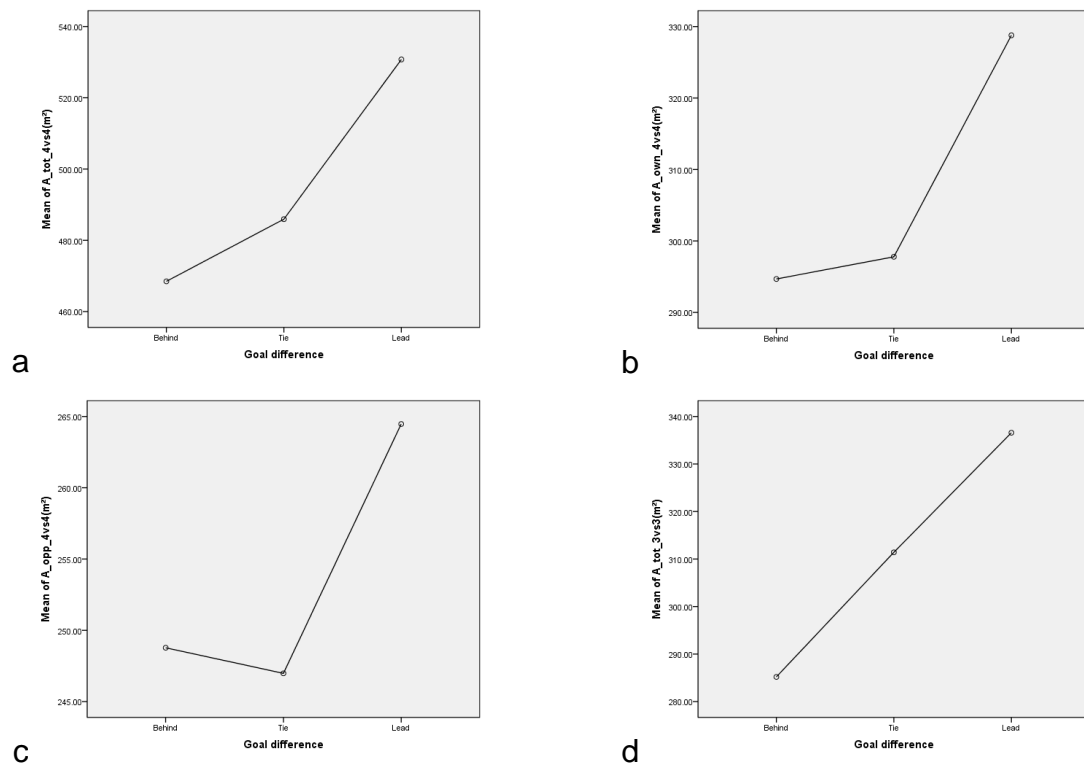
Comparing the Chinese and German games, substantial differences occurred in the game behavior of the opposing teams in relationship to the actual score of the games

in the two nationalities.

Starting with the German games (see Table 16 and Figure 30), in the (partially) collective pressure variables in all of the 4v4 situations, and also in two of the three 3v3 situations systematic differences could be found.

Table 16. The relationship between the three game score situations (behind, tie, lead) and the different distances to the nearest defender (m) of the total sample (N=4503)

Vars	N	F	P
A_tot_4v4	3225	10.15	0.00
A_own_4v4	3225	8.74	0.00
A_opp_4v4	3225	3.50	0.03
A_tot_3v3	3225	6.65	0.00
A_own_3v3	3225	8.96	0.00
A_opp_3v3	3225	1.84	0.16
Distance	3225	1.63	0.20



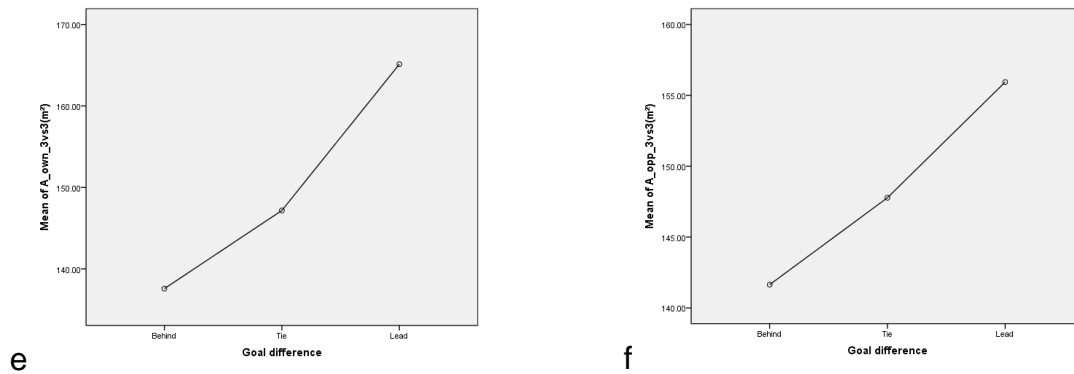


Figure 30. (a-f) The relationship between the actual game score and the pressure variables in the German games

As shown in Figure 30 (a-f) for a more detailed (post-hoc) comparison, in the German games sample ($n = 3,225$) and in regard to the more complex 4v4 areas, especially the total area A_{tot_4v4} there was no significant area size difference between the behind and the tie score. At the same time, the German opponent teams exerted lower pressure when in lead compared to the tie score ($p < 0.05$). In the A_{own_4v4} and the A_{opp_4v4} pressure variable there were no significant differences between the behind and the tie scores. Also, between the behind and the lead standing the area sizes were not systematically different.

In the 3v3 situation, in the variables A_{tot_3v3} and A_{own_3v3} there were no single significant differences between the behind and the tie scores. At the same time, the area size differences between the behind, as well as the tie score with the area size of the leading team were significant ($p < 0.05$). In the A_{opp_3v3} situation there were no significant differences between any of the three score differences.

As shown in Table 17 and Figure 31, in the German youth soccer games ($n = 3,225$), there were no significant differences in the distance to the nearest defender between any of the behind, tie, and lead scores of the games.

Table 17. The relationship between the score differences and the distance of the player with the ball and the nearest defender (m) in the German U17 games

	N	M(m)	SD	SE	Post-hoc (p)		
					Behind	Tie	Lead
Behind	125	4.91	3.71	0.33		0.21	0.10
Tie	965	5.40	4.07	0.13	0.21		0.37
Lead	2135	5.54	4.15	0.90	0.10	0.37	
Total	3225	5.47	4.11	0.07			

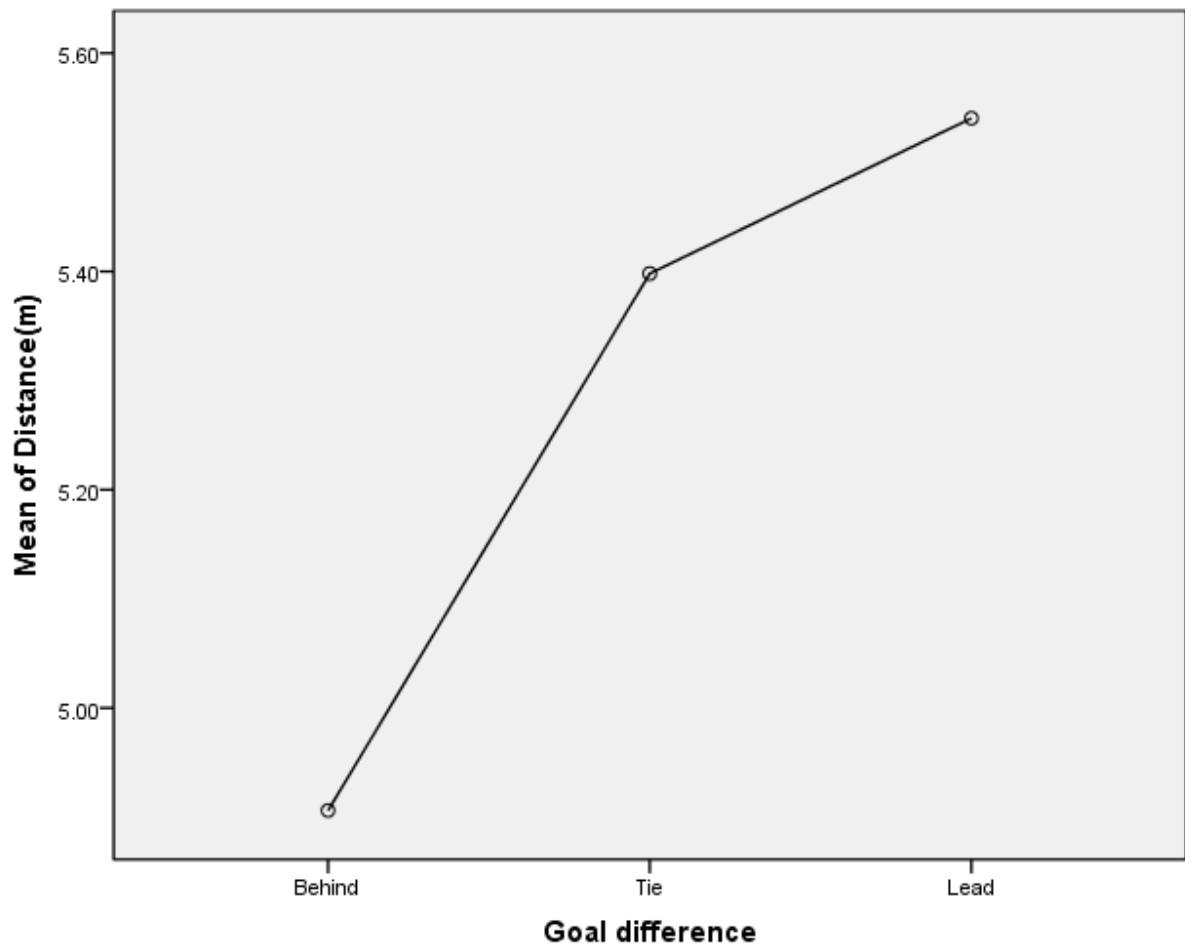


Figure 31. The relationship between the score differences and the distance between the player with the ball and the nearest defender in the German U17 youth soccer games

In the Chinese games (see Table 18 and Figure 32), in all of the (partially) collective pressure variables in the 4v4, as well as in the 3v3 situation systematic differences could be found.

Table 18. Analysis of all pressure variables according to the actual game score in the Chinese games

Variables	N	F	P
A_tot_4v4	1278	14.30	0.00
A_own_4v4	1278	20.94	0.00
A_opp_4v4	1278	18.20	0.00
A_tot_3v3	1278	11.03	0.00
A_own_3v3	1278	15.65	0.00
A_opp_3v3	1278	15.54	0.00
Distance	1278	8.51	0.00

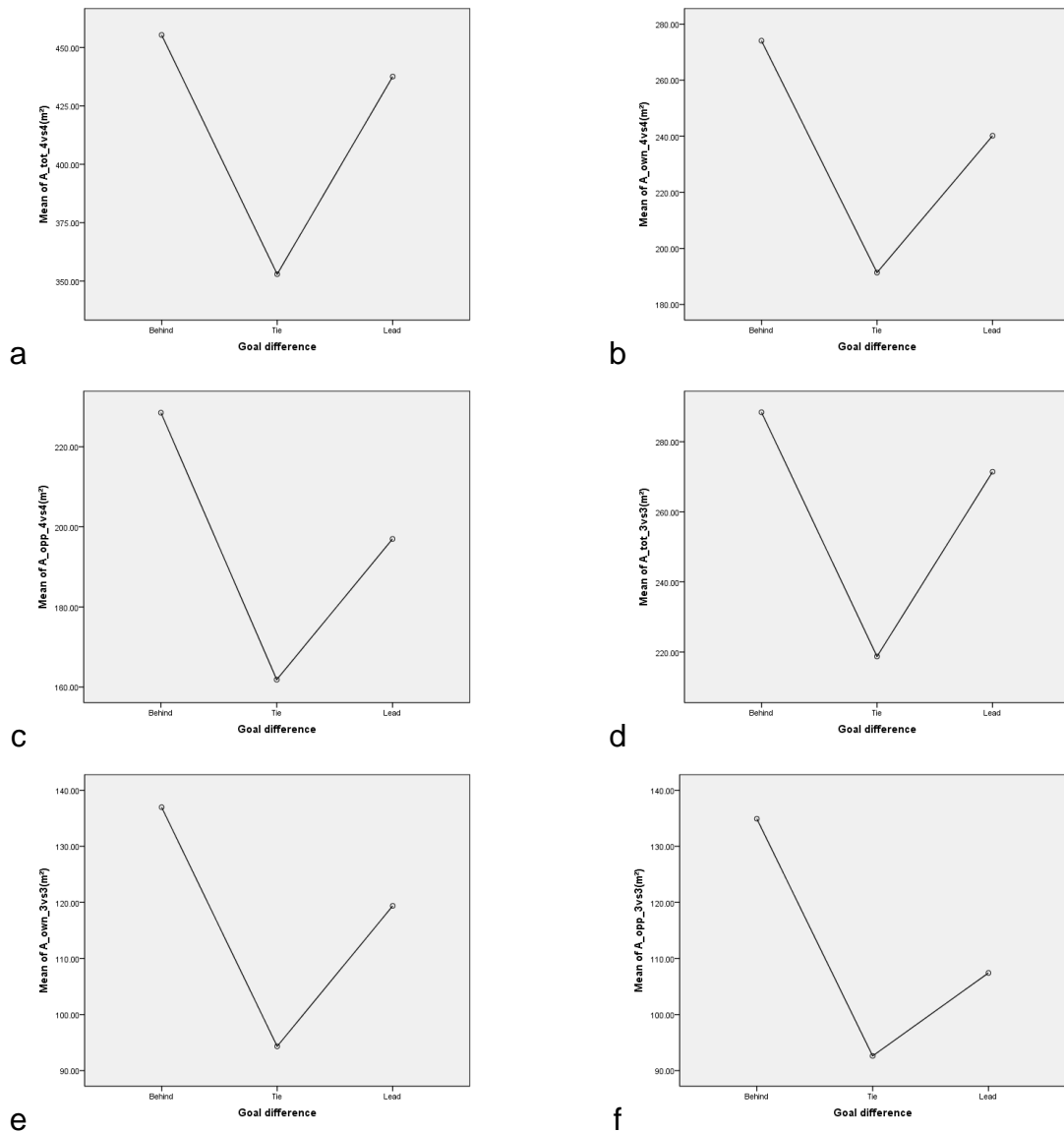


Figure 32. (a-f) The relationship between the actual game score and the pressure variables in the Chinese games

As shown in Figure 32 (a-f), and in regard to the more complex 4v4 areas, especially the total area A_tot_4v4 there was no significant area size difference between the behind and the tie score. At the same time, the German opponent teams exerted lower pressure when in lead compared to the tie score ($p < 0.05$). In the A_own_4v4 and the A_opp_4v4 pressure variable there were no significant differences between the behind and the tie scores. Also, between the behind and the lead standing the area sizes were not systematically different.

As shown in Figure 32 (a-f) for the more detailed (post-hoc) comparison, in the Chinese games sample ($n = 1,278$) in the pressure variable A_tot_4v4 there was a significant difference between the behind and the tie and the lead and the tie score ($p < 0.05$). On

the other hand, the group pressure between the behind and the lead score was insignificant. In the A_own_4v4 and the A_opp_4v4 there also were significant differences between all the three different actual standings during the games ($p < 0.05$).

In the less complex group situation A_tot_3v3 there were significant differences between the behind and the tie scores, as well as between the lead and the tie scores ($p < 0.05$). In regard to the A_own_3v3 variable, there were significant differences between all three game standings in the Chinese youth games ($p < 0.05$), whereas at least the defensive behavior of the three nearest players did not change between the tie and the lead situation of the team with the ball ($p > 0.05$).

As shown in Table 19 and Figure 33, in the Chinese youth soccer games ($n = 1,728$), there were significant differences in the distance of the player with the ball and the nearest defender between the behind and the tie as well as between the behind and the lead score ($p < 0.05$).

Table 19. The relationship between the score differences and the distance of the player with the ball and the nearest defender (m) in the Chinese U17 games

	N	Mean	SD	SE	P		
					Behind	Tie	Lead
Behind	760	4.88	3.73	0.14		0.00	0.02
Tie	199	3.80	3.27	0.23	0.00		0.10
Lead	319	4.32	3.16	0.18	0.02	0.10	
Total	1278	4.57	3.55	0.10			

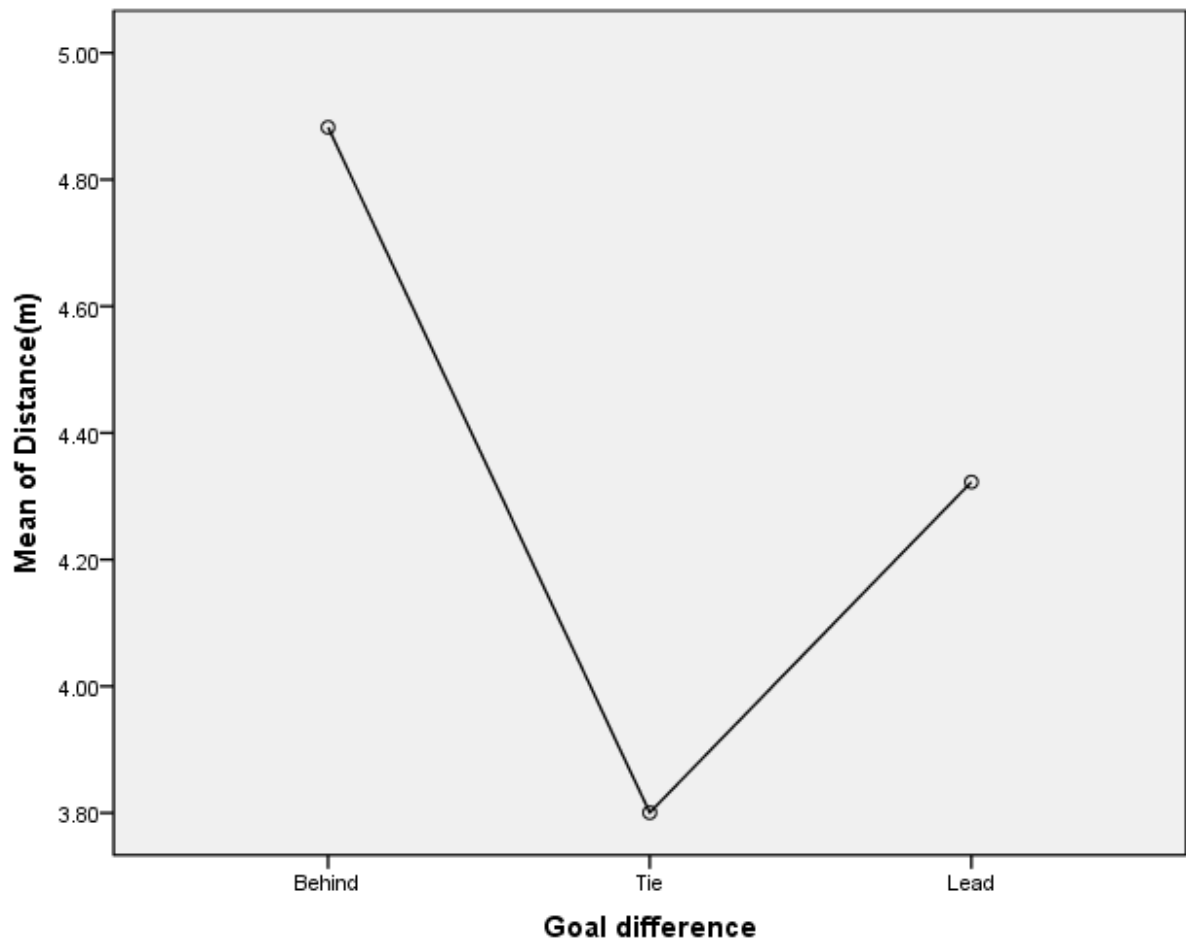


Figure 33. The relationship between the score differences and the distance between the player with the ball and the nearest defender in the Chinese U17 youth soccer

4.2.3 The difference between releasing and receiving the ball

In this part of the results, the differences between the various areas formed by the athletes and the distance between the player with the ball and the nearest defender in the two individual technical and tactical core situations of the (1) receive of the ball and the (2) release of the ball is presented. So, the receive action is coded as situation “1”, and the pass action is coded as “2”. The hypothesis for the testing was that there is no significant difference in the observed pressure indicators between the moment of the receive of the ball and the moment of the release of the ball.

Table 20 shows the differences in the full game sample in regard to the *4v4 situation*. The mean differences in the area size between the moments of the receive and the release of the ball in the variables *A_tot_4v4*, *A_own_4v4*, and *A_opp_4v4* were -41.42 m², -30.40 m², and -44.79 m². As all these differences were significantly negative ($p < 0.05$), these findings express a growing pressure on the player with the ball. This is corroborated also by the significant reduction of the distance to the nearest defender.

Table 21 shows the findings in the *3v3 situation*. Again, all mean differences of the area sizes (*A_tot_3v3*: -27.25 m², *A_own_3v3*: -18.91 m², and *A_opp_3v3*: -26.00 m²) and the distance to the nearest defender between the receive and release states were significantly negative, with a large variation within the samples (see Appendix 4 for details).

Table 20. Descriptive analysis of the game pressure at the moments of the receive and the release of the ball in the 4v4 situation in the total sample

	n	M (m ²)	SD	n	M (m ²)	SD	T	P
	Receive			Release				
<i>A_tot_4v4</i>	2195	513.37	286.98	2308	472.13	260.68	5.040	0.00
<i>A_own_4v4</i>	2195	315.19	205.55	2308	284.79	183.64	5.225	0.00
<i>A_opp_4v4</i>	2195	267.86	180.46	2308	223.07	155.89	8.894	0.00
Distance(m)	2195	6.10	4.32	2308	4.38	3.43	14.78	0.00
All samples	Game action: receive (1)			Game action: release (2)				

Table 21. Analysis of the game pressure at the moments of the receive and the release of the ball in the 3v3 situation in the total sample

	N	M	SD	N	M	SD	T	P
	Receive			Release				
A_tot_3v3	2195	325.77	223.23	2308	298.52	203.42	4.28	0.00
A_own_3v3	2195	159.08	124.12	2308	140.17	111.62	5.37	0.00
A_opp_3v3	2195	157.33	134.28	2308	131.33	112.88	7.02	0.00
Distance	2195	6.10	4.32	2308	4.38	3.43	14.78	0.00
All samples	Game action: receive (1)			Game action: release (2)				

The Tables 22-25 show the results of the comparison between the Chinese and German games in the two investigated moments of the receive and the release of the ball. In general, the absolute difference in the area sizes in the two pressure situations in the German sample is much more pronounced than in the Chinese sample, and being significant in each observed variable.

However, in the Chinese games (see Table 22 and 23) the three variables (A_tot_4v4, A_own_4v4, A_tot_3v3) the area sizes are not reduced from the receive to the moment of release of the ball.

Table 22. Analysis of the game pressure at the moments of the receive and the release of the ball in the 4v4 situation in the Chinese games

	N	M	SD	N	M	SD	T	P
	Receive			Release				
A_tot_4v4	699	439.89	254.16	579	429.01	229.28	0.80	0.42
A_own_4v4	699	259.74	176.79	579	244.27	156.28	1.66	0.10
A_opp_4v4	699	225.92	155.60	579	191.34	135.72	4.24	0.00
Distance	699	5.08	3.79	579	3.96	3.12	5.78	0.00
Chinese Samples	Game action: receive (1)			Game action: release (2)				

Table 23. Analysis of the game pressure at the moments of the receive and the release of the ball in the 3v3 situation in the Chinese games

	N	M	SD	N	M	SD	T	P
	Receive			Release				

A tot 3v3	699	282.13	200.89	579	262.67	170.61	1.87	0.06
A own 3v3	699	133.21	109.00	579	117.16	86.78	2.93	0.00
A opp 3v3	699	132.72	116.26	579	107.88	99.67	4.11	0.00
Distance	699	5.08	3.79	579	3.96	3.12	5.78	0.00
Chinese Samples	Game action: receive (1)			Game action: release (2)				

In the German games (see Table 24 and 25) in the two interesting moments of the receive and the release of the ball, the absolute differences in the area sizes and the distance to the nearest defender in the two pressure situations are much greater than in the Chinese games being significant in each of the observed variable.

Table 24. Analysis of the game pressure at the moments of the receive and the release of the ball in the 4v4 situation in the German games

	N	M	SD	N	M	SD	T	P
	Receive			Release				
A tot 4v4	1496	547.71	294.96	1729	486.57	268.90	6.12	0.00
A own 4v4	1496	341.10	212.85	1729	298.35	190.05	5.98	0.00
A opp 4v4	1496	287.46	187.83	1729	233.69	160.72	8.66	0.00
Distance	1496	6.58	4.46	1729	4.52	3.52	14.11	0.00
German Samples	Game action: receive (1)			Game action: release (2)				

Table 25. Analysis of the game pressure at the moments of the receive and the release of the ball in the 3v3 situation in the German games

	N	M	SD	N	M	SD	T	P
	Receive			Release				
A tot 3v3	1496	346.16	230.18	1729	310.53	211.98	4.55	0.00
A own 3v3	1496	171.17	128.85	1729	147.88	117.80	5.33	0.00
A opp 3v3	1496	168.83	140.48	1729	139.18	115.94	6.48	0.00
Distance	1496	6.58	4.46	1729	4.52	3.52	14.41	0.00
German Samples	Game action: receive (1)			Game action: release (2)				

To present the comparison results more clearly, we integrated the German and the Chinese sample in the Figures 34-36 to provide an overview of the pressure variables

at the two moments of the receive and the release of the ball.

Figure 34 shows the average distance between the team members with the ball and the nearest defenders in all cases of the receive and the release of the ball. It can be seen that in the overall sample, the mean values of the distance to the nearest defender at both instances are approximately 6.1m and 4.4 m, respectively. At the same time, in both moments of the two game actions, the mean value of the German sample is higher than the mean value of the Chinese sample, indicating that there may be some differences in the pressure level or tension of the two national league players (See Fig 34)

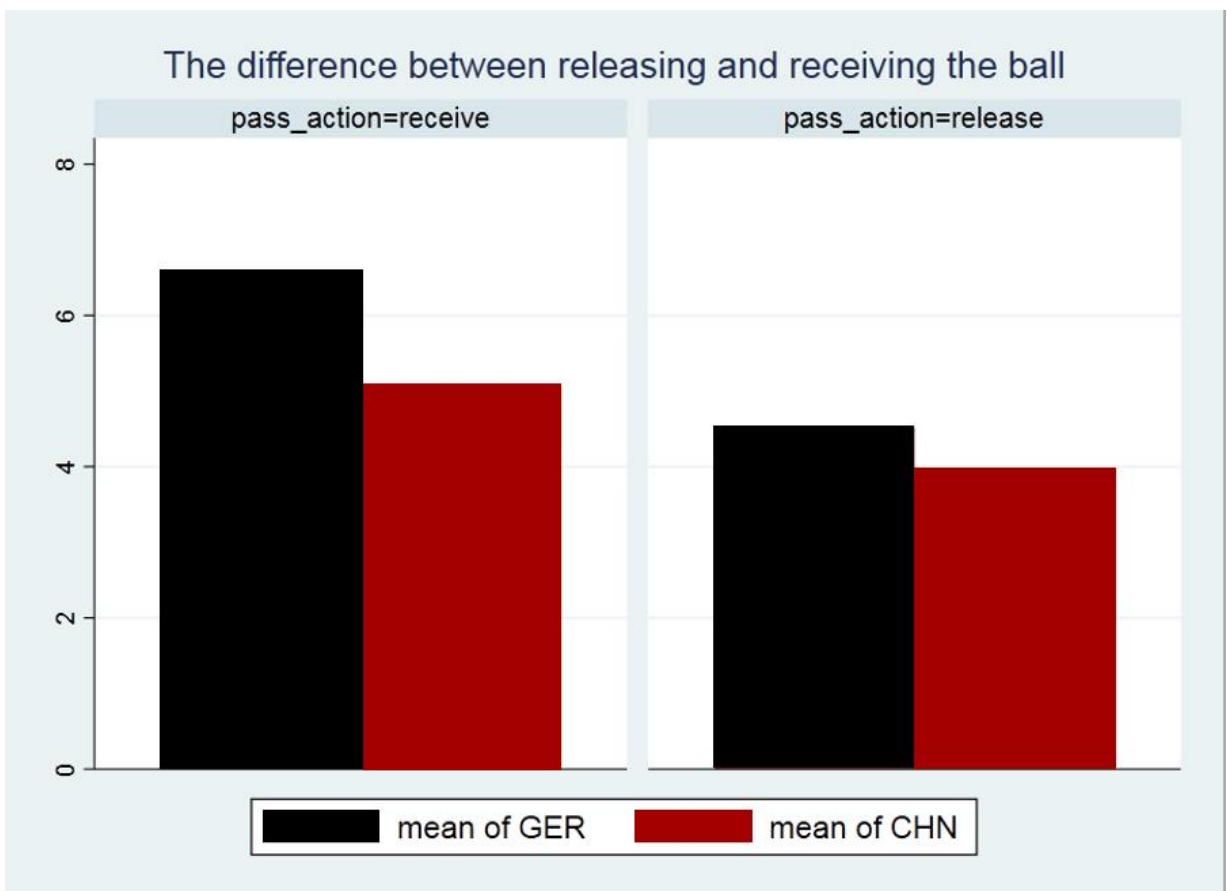


Figure 34. The change of the distance of the player with the ball to the nearest defender in the German and the Chinese U17 youth soccer games at the moments of the receive and the release of the ball

Similarly, we also plotted the mean histograms of particular pressure areas formed by the athletes of the two nationalities. It is obvious that at the moment of the receive of the ball, the values of the two area variables in the 4v4 situation (A_{own_4v4} and A_{opp_4v4}) are all higher than the values in the release state. Furthermore, the area

formed by the defending players is the largest. Comparing the samples of China and Germany, we can also find that the pitch area enclosed by German players is significantly larger (See Fig.35).

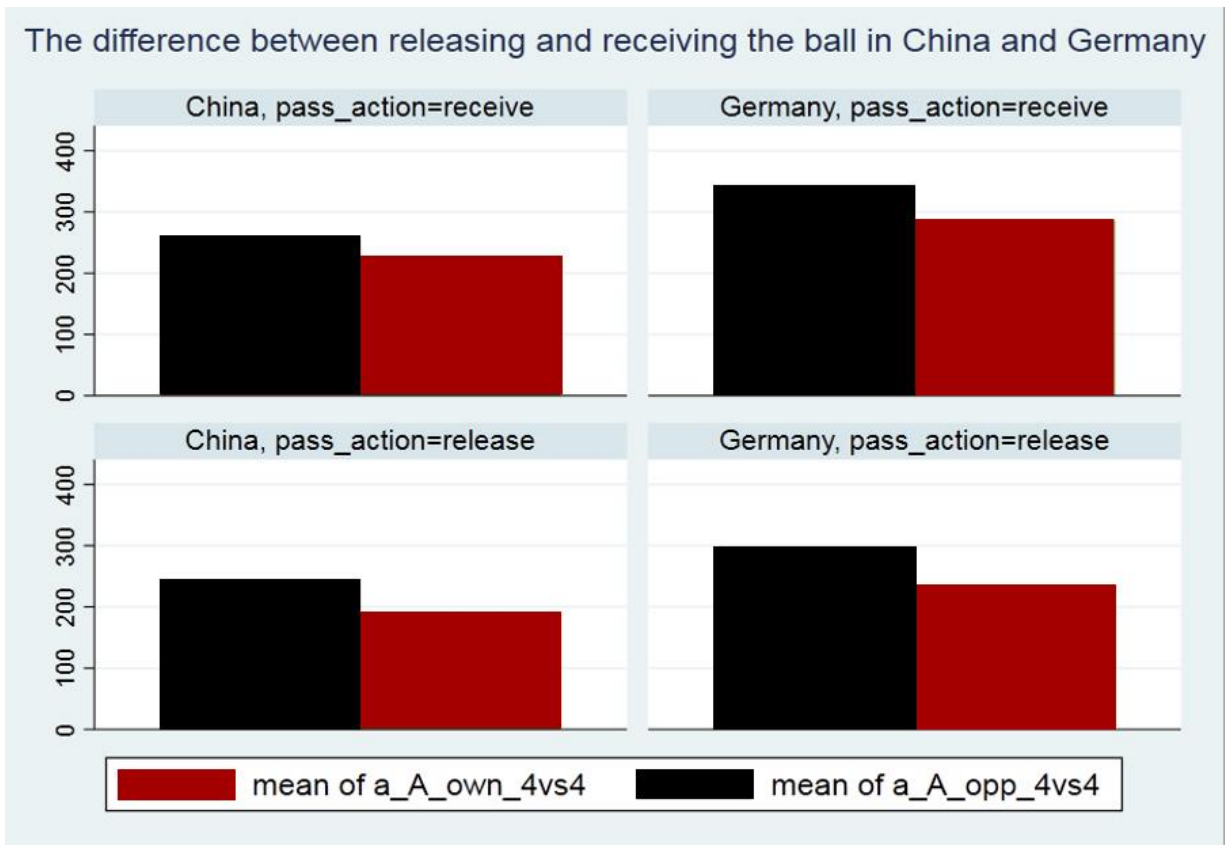


Figure 35. The differences between the German and the Chinese U17 youth soccer games in regard to area sizes in the 4v4 situation covered by the own and opponent players at the moments of the receive and the release of the ball

In order to facilitate the inspection of the comparisons, Figure 36 shows the histogram of the athlete in the case of 3v3. It can be seen that in the case of catching the ball, the values of the two area size variables A_{own_3v3} and A_{opp_3v3} are both greater than the values in the release state. In addition to that, the area formed by the defensive player is the largest. At the same time, comparing the observed games from China and Germany, in the German games we generally find larger areas covered by the players in both the receive and release situations (see Figure. 36). This might be a sign of a better tactical distribution of the offensive players on the pitch, as well as a faster passing, which does not allow the defense for a faster approach to the player with the ball.

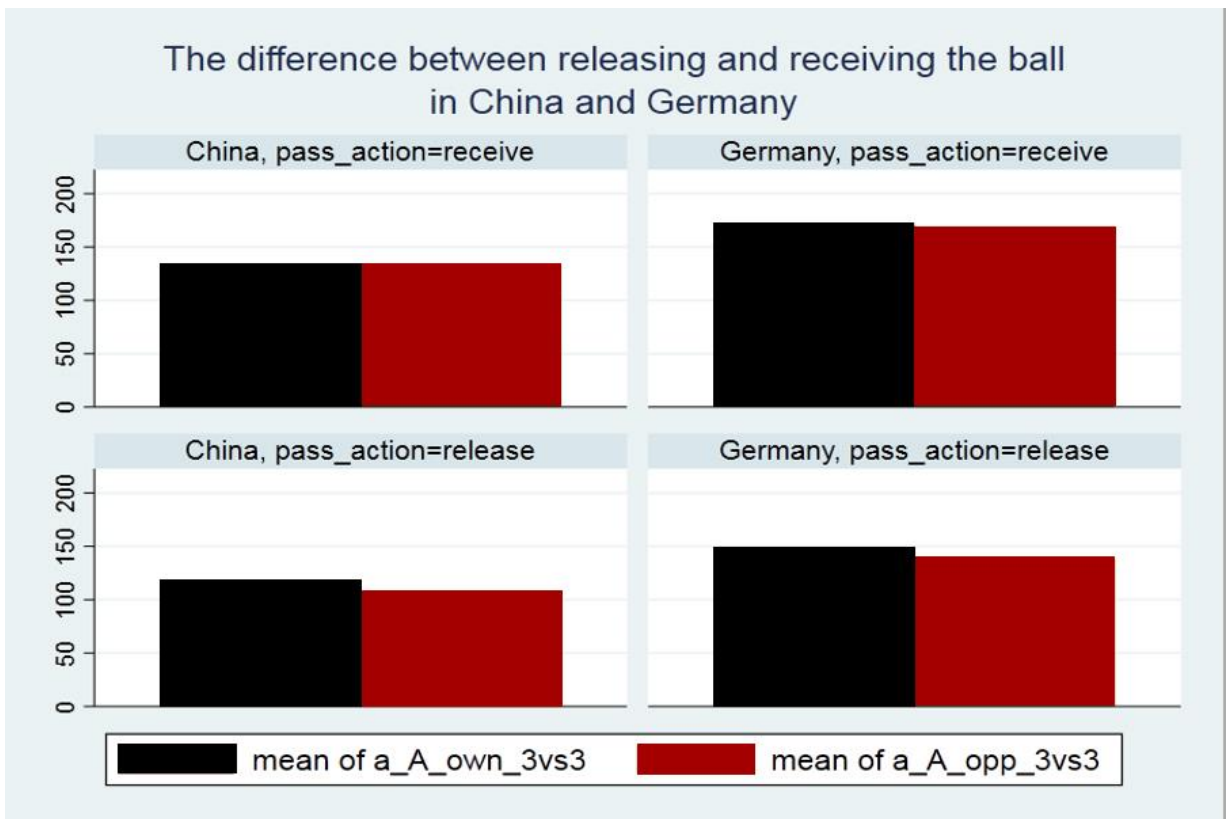


Figure 36. The differences between the German and the Chinese U17 youth soccer games in regard to area sizes in the 3v3 situation covered by the own and opponent players at the moments of the receive and the release of the ball

4.2.4 The difference between the pressure in the goal zone of 30 meters and the middle field zone

In the different zones of the soccer pitch the pressure on the player with the ball should vary substantially. So, in the present part of the study the results in regard to the differences between the various pressure areas formed by the athletes of both teams, as well as the findings in regard to the distance between the player with the ball and the nearest defender are shown. For this analysis, I defined the position of the athlete in the offensive zone that is the area that is closer than 30 meters to the opponent goal as *offensive zone* (1). The *midfield zone* (2) represents the pitch area of all other pitch areas except the offensive zone (see Fig 37). In the analysis, I hypothesized that the pressure on the player with the ball were higher in the offensive zone 30 meters in front of the opponent goal compared to the midfield zone.

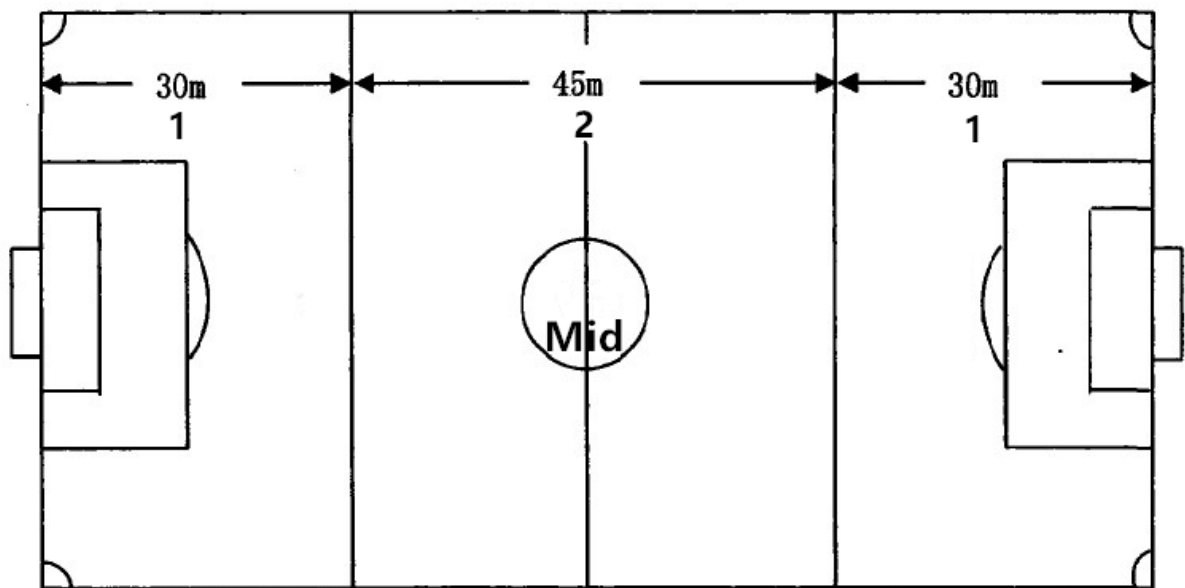


Figure 37. The offensive zone and the midfield zone on the soccer pitch

Table 26 shows the differences in the pressure for the total sample in regard to the *4v4 situation*. The mean differences in the area size of the midfield and the offensive zone were $M_{diff} = 10.50 \text{ m}^2$ in the variable A_{tot_4v4} , $M_{diff} = 19.73 \text{ m}^2$ in the variable A_{own_4v4} , and $M_{diff} = -13.72 \text{ m}^2$ in the variable A_{opp_4v4} . Among these areas the four players of the own team, and also the area covered by the players of the opponent teams were significantly different ($p < 0.05$) between the pitch zones showing on the defensive side a growing pressure on the player with the ball, and in contrast to that on

the offensive side a wider distribution of the three nearest teammates which expresses the efforts to explore more space to allow for a safer passing within the offensive team. In regard to the defensive team, the findings are in line with a significant reduction of the distance to the nearest defender. This result also reflect that the athletes face greater pressure the ball and the goal in the offensive zone (See Appendix 5 for details).

Table 26. Analysis of the game pressure in the offensive and midfield zone in the 4v4 situation in the total sample

	N	M	SD	N	M	SD	T	P
	offensive zone			Midfield zone				
A tot 4v4 (m ²)	1159	500.04	316.60	3344	489.53	258.40	1.02	0.31
A own 4v4 (m ²)	1159	314.26	222.65	3344	294.53	184.50	2.71	0.01
A opp 4v4 (m ²)	1159	234.71	190.58	3344	248.43	161.83	-2.19	0.03
Distance (m)	1159	4.48	3.48	3344	5.47	4.11	-7.94	0.00

Table 27 shows the findings in the 3v3 situation. Only the mean difference of the area size covered by the opponent team (A_opp_3v3: $M_{diff} = -13.02 \text{ m}^2$) was significantly negative.

Table 27. Analysis of the game pressure in the offensive and midfield zone in the 3v3 situation in the total sample

	N	M	SD	N	M	SD	T	P
	offensive zone			Midfield zone				
A tot 3v3 (m ²)	1159	306.73	229.39	3344	313.57	208.02	-0.90	0.37
A own 3v3 (m ²)	1159	155.13	130.82	3344	147.40	113.51	1.79	0.07
A opp 3v3 (m ²)	1159	134.33	132.05	3344	147.36	121.53	-2.95	0.00
Distance (m)	1159	4.48	3.48	3344	5.47	4.11	-7.94	0.00

The Tables 28-31 present the findings for the Chinese and German U17 youth soccer payers separately. The absolute difference between the two zones in the German sample is much larger than in the Chinese sample, indicating that the area formed by German athletes and the distance between the player with the ball and the nearest defender are greater in both pitch zones.

Table 28. Analysis of the game pressure in the offensive and midfield zone in the 4v4 situation in the Chinese games

	N	M	SD	N	M	SD	T	P
	Offensive zone			Midfield zone				
A tot 4v4(m ²)	212	406.17	250.64	1066	440.69	241.37	-1.89	0.06
A own 4v4(m ²)	212	241.52	168.49	1066	254.96	167.80	-1.07	0.29
A opp 4v4(m ²)	212	170.41	139.83	1066	218.18	148.21	-4.33	0.00
Distance (m)	212	3.60	2.58	1066	4.77	3.68	-5.57	0.00

Table 29. Analysis of the game pressure in the offensive and midfield zone in the 3v3 situation in the Chinese games

	N	M	SD	N	M	SD	T	P
	Offensive zone			Midfield zone				
A tot 3v3(m ²)	212	248.63	186.37	1066	278.22	187.97	-2.10	0.04
A own 3v3(m ²)	212	115.96	102.49	1066	127.93	99.22	-1.60	0.11
A opp 3v3(m ²)	212	95.34	96.27	1066	126.66	111.51	-3.81	0.00
Distance (m)	212	3.60	2.58	1066	4.77	3.68	-5.57	0.00

Table 30. Analysis of the game pressure in the offensive and midfield zone in the 4v4 situation in the German games

	N	M	SD	N	M	SD	T	P
	Offensive zone			Midfield zone				
A tot 4v4(m ²)	947	521.05	325.99	2278	512.38	262.95	0.72	0.47
A own 4v4(m ²)	947	330.54	230.00	2278	313.04	189.03	2.07	0.04
A opp 4v4(m ²)	947	249.11	197.39	2278	262.59	165.97	-1.85	0.07
Distance(m)	947	4.68	3.63	2278	5.80	4.26	-7.58	0.00

Table 31. Analysis of the game pressure in the offensive and midfield zone in the 3v3 situation in the German games

	N	M	SD	N	M	SD	T	P
	Offensive zone			Midfield zone				
A tot 3v3(m ²)	947	319.74	236.09	2278	330.11	214.82	1.17	0.24
A own 3v3(m ²)	947	163.90	134.86	2278	156.51	118.54	1.47	0.14
A opp 3v3(m ²)	947	143.06	137.33	2278	157.04	124.80	-2.81	0.01
Distance(m)	947	4.68	3.63	2278	5.80	4.26	-7.58	0.00

Figure 38 shows the average distance between the offensive player with the ball and the nearest defender in the offensive and midfield zone in the Chinese games compared to the German games.

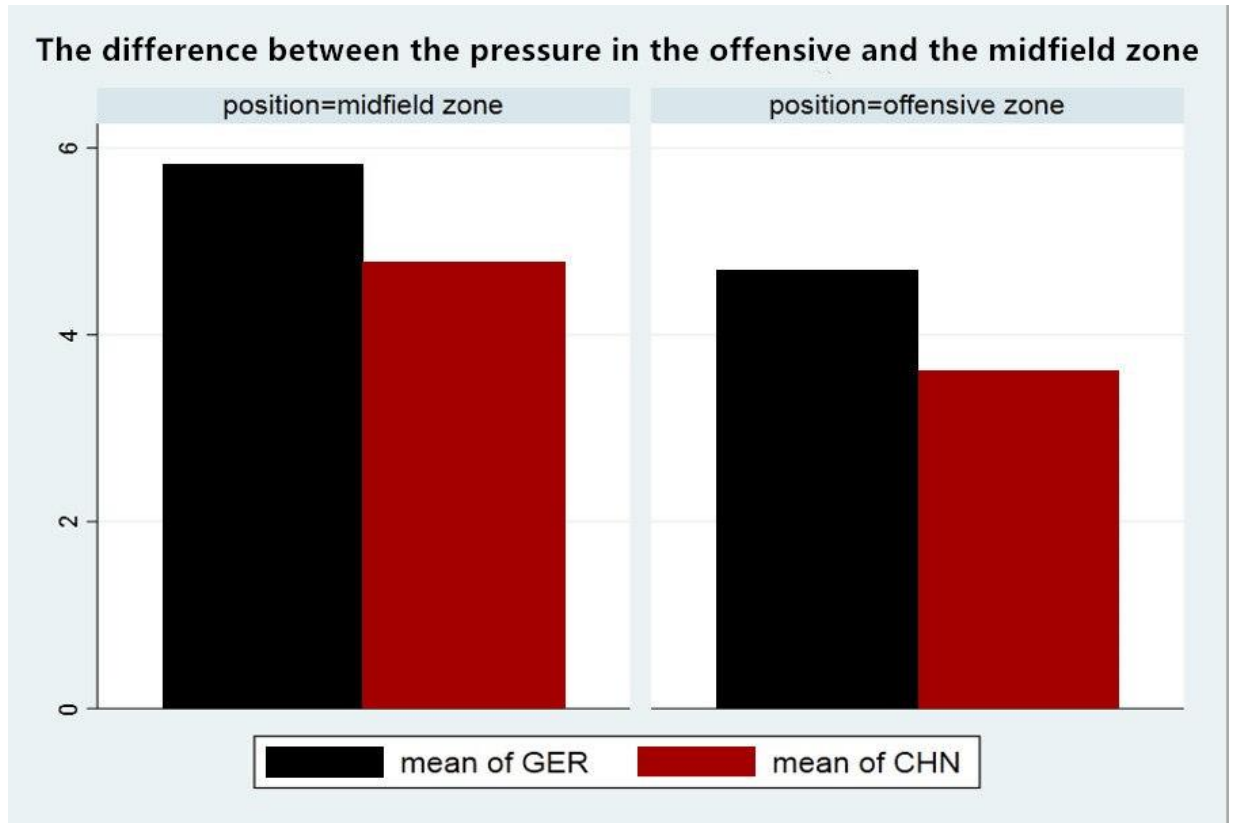


Figure 38. The different distances between the offensive player with the ball and the nearest defender in the German and the Chinese U17 youth soccer games in the offensive and the midfield zone of the soccer pitch

When the offensive team with the player with the ball is in the offensive zone that is in the opponents` side of the court, the distance between the player with the ball and the nearest defender is significantly reduced (see Fig. 38). The offensive player in possession of the ball in this zone is under a greater degree of pressure. For the two nationalities, the mean difference in the German games was $M_{diff} = 5.80$ m, which was significantly ($p < 0.05$) higher than the difference in the Chinese games ($M_{diff} = 4.77$ m).

Figure 39 shows by histograms the area size differences in the *4v4 situation* formed by the athletes of the two nationalities. According to Figure 39, and comparing the Chinese and German games, the mean values of A_{own_4v4} and A_{opp_4v4} were significantly different between the two nationalities. Also, when the Chinese and the German teams

each were in the offensive zone that is in the opponents` half of the pitch the area formed by the opponent players (A_opp_4v4) was much more dense ($p < 0.01$), which is consistent with the hypothesized effect of the defensive players` game positions and tactical behavior.

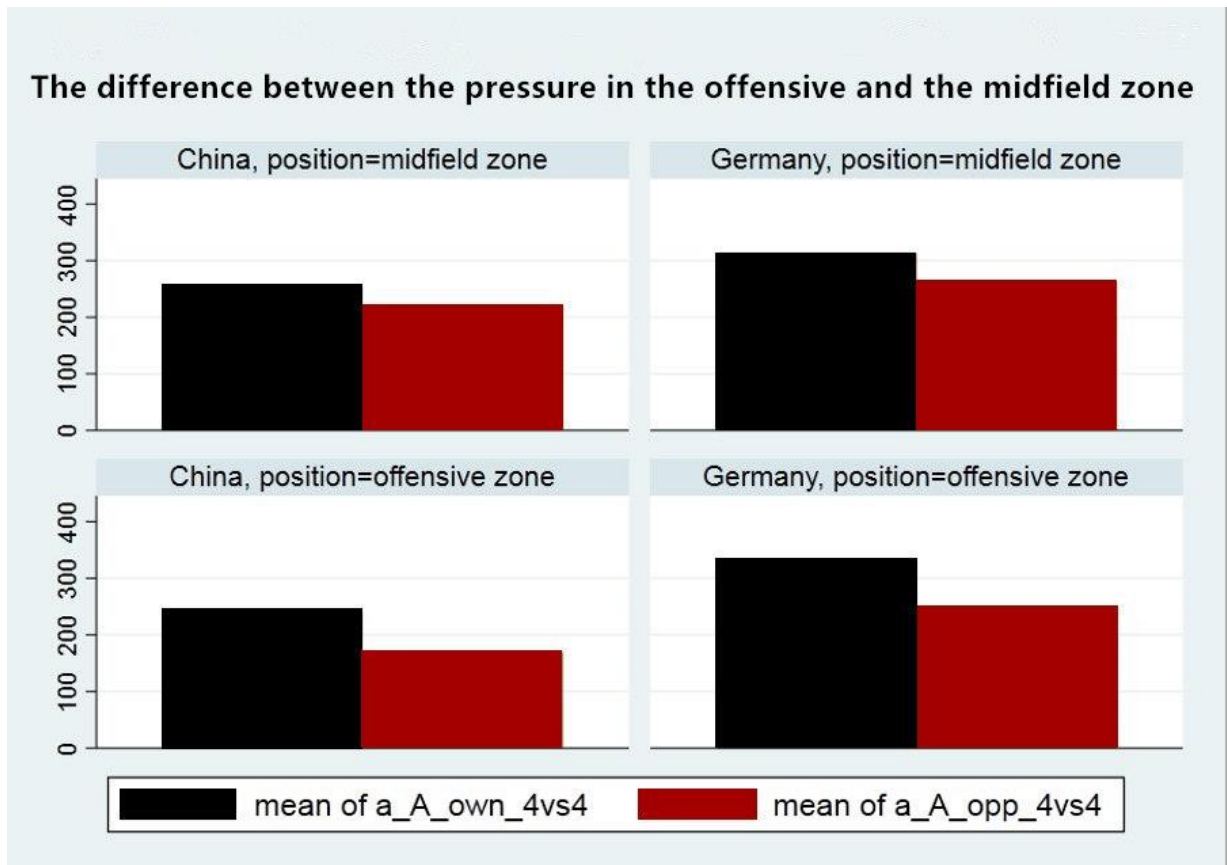


Figure 39. The differences between in the German and the Chinese U17 youth soccer games in regard to area sizes in the 4v4 situation covered by the three nearest own and the four nearest opponent players in the offensive and the midfield zone of the soccer pitch

In the *3v3 situation* (see Fig. 40) the areas formed by the youth soccer players of the different countries in general show that in the Chinese games the pressure on the team with the ball was higher. According to Figure 40, at least in the Chinese games the average area sizes (see A_own_3v3 and A_opp_3v3; $p < 0.05$.) in the offensive zone were smaller than in Germany, indicating a higher pressure on the player with the ball in the Chinese U17 youth soccer games, but also a better distribution of the offensive players on the soccer pitch in the German games.

The difference between the pressure in the offensive and the midfield zone

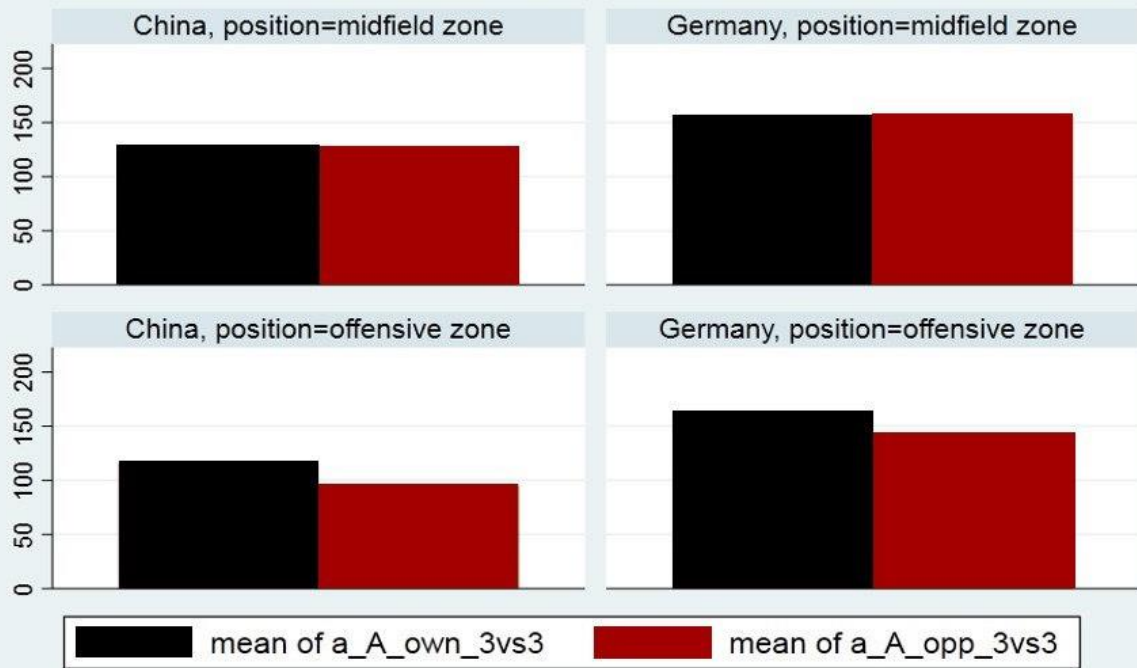


Figure 40. The differences between in the German and the Chinese U17 youth soccer games in regard to area sizes in the 3v3 situation covered by the two nearest own and the three nearest opponent players in the offensive and the midfield zone of the soccer pitch

4.2.5 The difference between the success release and fail release under pressure

The ability of a football player to successfully pass the ball to his teammates is an important skill to characterize the performance of a good football player (Bush, Barnes, Archer, Hogg, & Bradley, 2015). Therefore, it is important to know, Whether there is a close relation between the pressure level on the pitch and the individual success rate in the release situation (see above, Chapter 4.2.3). In the following a failed release outcome is coded as “0”, and code “1” comprises all successful release situations that is the ball is received by the next own player. In general, it is hypothesized that the individual quota of successful passes has an impact on the outcome of the game. According to the literature (Hughes & Franks, 2005), longer passing sequences lead to more goals per possession compared to shorter passing sequences.

Table 32 shows the mean difference between the two pass outcomes for the full sample of games in Germany and China in the *4v4 situation*. In regard to the failed passes the mean values of the pressure on the pitch was substantially higher, which can be seen in the smaller area sizes in the variables *A_tot_4v4*, *A_own_4v4*, and *A_opp_4v4*. The mean difference between the area sizes of the two ball release outcomes was for the area covered by all 8 players $M_{diff} = -57.23$. When looking only at the four players of the own team the difference was $M_{diff} = -40.74$, and the difference in the area size covered by the next four opponent players was $M_{diff} = -47.36$. Besides these three contrasts, also the distance between the player with the ball and the nearest defender were significant ($p < 0.05$).

Table 32. Analysis of the game pressure in failed and successful pass actions in the 4v4 situation in the total sample of the games

	N	M	SD	N	M	SD	T	P
	Failed pass			Successful pass				
A tot 4v4 (m ²)	583	442.41	237.22	3920	499.64	278.96	-5.31	0.00
A own 4v4 (m ²)	583	264.73	179.67	3920	304.79	196.90	-4.96	0.00
A opp 4v4 (m ²)	583	203.68	144.00	3920	251.03	172.46	-7.21	0.00
Distance (m)	583	3.73	2.74	3920	5.44	4.09	-13.06	0.00

Table 33 shows the findings in the *3v3 situation*, where the findings were more or less the same that is all differences in the area size covered by the investigated player groups were significantly reduced in the failed pass action ($p < 0.05$)

Table 33. Analysis of the game pressure in failed and successful pass actions in the 3v3 situation in the total sample of the games

	N	M	SD	N	M	SD	T	P
	Failed pass			Successful pass				
A tot 3v3 (m ²)	583	266.74	189.19	3920	318.51	216.35	-6.05	0.00
A own 3v3 (m ²)	583	129.37	112.69	3920	152.37	118.77	-4.57	0.00
A opp 3v3 (m ²)	583	108.70	94.38	3920	149.25	127.49	-9.20	0.00
Distance (m)	583	3.73	2.74	3920	5.44	4.09	-13.06	0.00

The Tables 34–37 show the statistics of the Chinese and German games in the two cases of success and failure of the release actions separately. The differences in the mean values between the two action qualities were significantly negative ($p < 0.05$), meaning that a higher pressure on the pitch led to systematically more unsuccessful passes that is lost balls. Secondly, in all eight area size and distance variables (A_tot_4v4, A_own_4v4, A_opp_4v4, A_tot_3v3, A_own_3v3, A_opp_3v3, and the distances to the nearest defender in the 4v4 and 3v3 situation) the pressure in the German U17 youth games was significantly lower than in the Chinese games (See Appendix 6 for details), which might be due to a better player distribution over the soccer pitch in the offense or a more reclusive match play behavior in the defense of the German first division U17 youth soccer teams.

Table 34. Analysis of the game pressure in failed and successful pass actions in the 4v4 situation in the Chinese games

	N	Mean	SD	N	Mean	SD	T	p
	Failed pass			Successful pass				
A tot 4v4 (m ²)	161	405.24	221.27	1117	439.25	245.96	-1.66	0.10
A own 4v4 (m ²)	161	228.38	147.58	1117	256.24	170.43	-2.19	0.03
A opp 4v4 (m ²)	161	163.09	103.00	1117	217.05	152.10	-5.80	0.00
Distance (m)	161	3.33	2.16	1117	4.75	3.67	-7.01	0.00

Table 35. Analysis of the game pressure in failed and successful pass actions in the 3v3 situation in the Chinese games

	N	M	SD	N	M	SD	T	P
	Failed pass			Successful pass				
A tot 3v3 (m ²)	161	240.41	163.72	1117	278.06	190.80	-2.67	0.01
A own 3v3 (m ²)	161	109.77	86.39	1117	128.27	101.45	-2.48	0.01
A opp 3v3 (m ²)	161	82.95	56.64	1117	127.01	114.32	-7.84	0.00
Distance (m)	161	3.33	2.16	1117	4.75	3.67	-7.01	0.00

Table 36. Analysis of the game pressure in failed and successful pass actions in the 4v4 situation in the German games

	N	M	SD	N	M	SD	T	P
	Failed pass			Successful pass				
A tot 4v4 (m ²)	422	456.59	241.77	2803	523.71	287.59	-5.18	0.00
A own 4v4 (m ²)	422	278.59	188.82	2803	324.14	203.32	-4.33	0.00
A opp 4v4 (m ²)	422	219.16	154.15	2803	264.57	178.16	-5.52	0.00
Distance (m)	422	3.88	2.92	2803	5.71	4.213	-11.25	0.00

Table 37. Analysis of the game pressure in failed and successful pass actions in the 3v3 situation in the German games

	N	M	SD	N	M	SD	T	P
	Failed pass			Successful pass				
A tot 3v3 (m ²)	422	276.78	197.30	2803	334.63	223.74	-5.51	0.00
A own 3v3 (m ²)	422	136.85	120.49	2803	161.97	123.73	-3.90	0.00
A opp 3v3 (m ²)	422	118.53	103.65	2803	158.12	131.35	-7.04	0.00
Distance (m)	422	3.88	2.92	2803	5.71	4.21	-11.25	0.00

To visualize these findings, in Figure 41 the histogram of the distance to the nearest defender is presented showing that on the one hand the pressure was higher caused by a shorter distance to the next opponent in situations that led to a failed pass, and on the other hand that in general the pressure was lower in the German games, indicating that there may be some technical and/or tactical differences between the two nationalities in the handling of the game pressure level on the pitch.

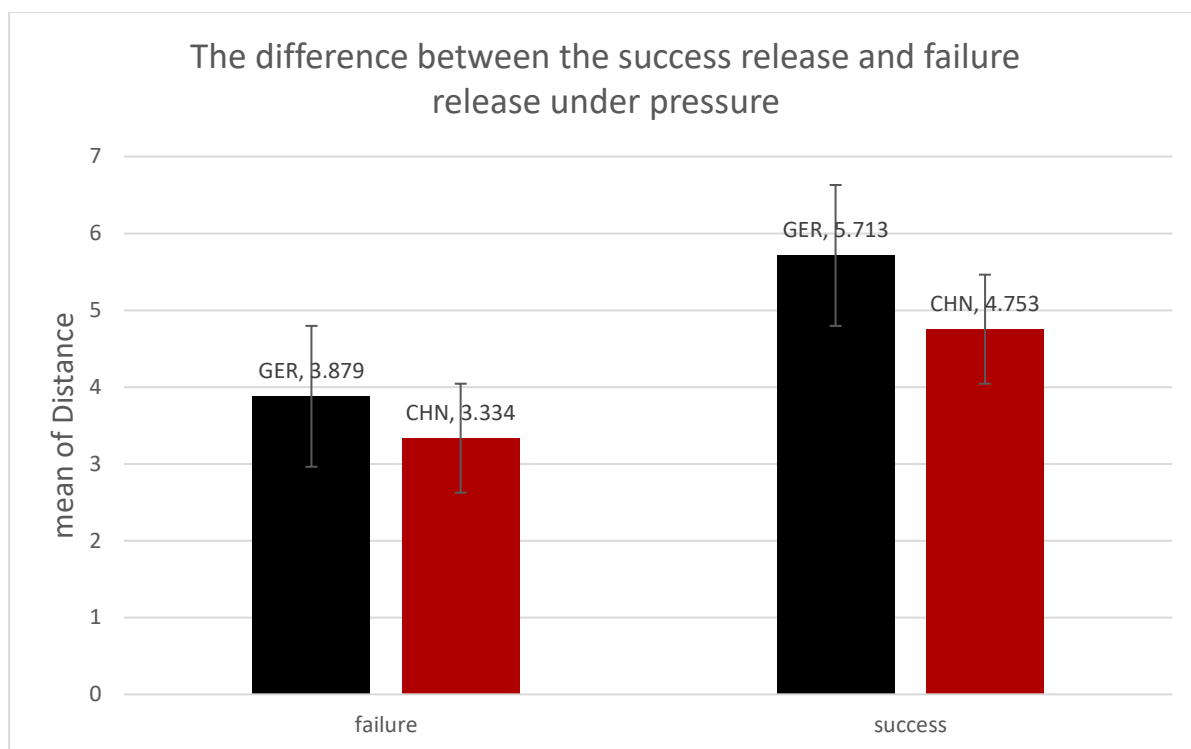


Figure 41. The differences between in the German and the Chinese U17 youth soccer games in regard to the distance of the player with the ball to the nearest defender in failed and successful pass actions

Similarly, we also plotted the histograms of the area sizes covered by the athletes in the *4v4 situation* (see Fig. 42 and Fig. 44). In the case of unsuccessful ball releases, the mean values of the two game pressure variables A_{own_4v4} and A_{opp_4v4} in the German sample were significantly larger than in the Chinese games.

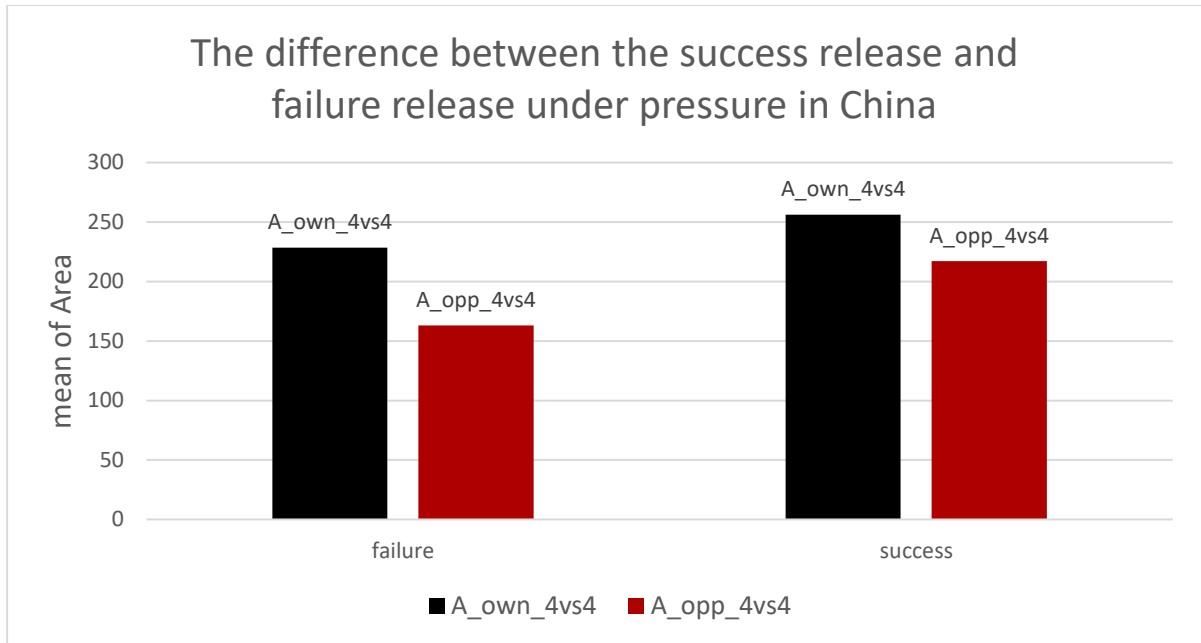


Figure 42. The differences the area sizes covered by the player with the ball and his nearest three teammates (A_own_4v4), and also in regard to the area size covered by the nearest four defenders of the opponent team (A_opp_4v4) in failed and successful pass actions in the 4v4 situation in the Chinese U17 youth soccer games

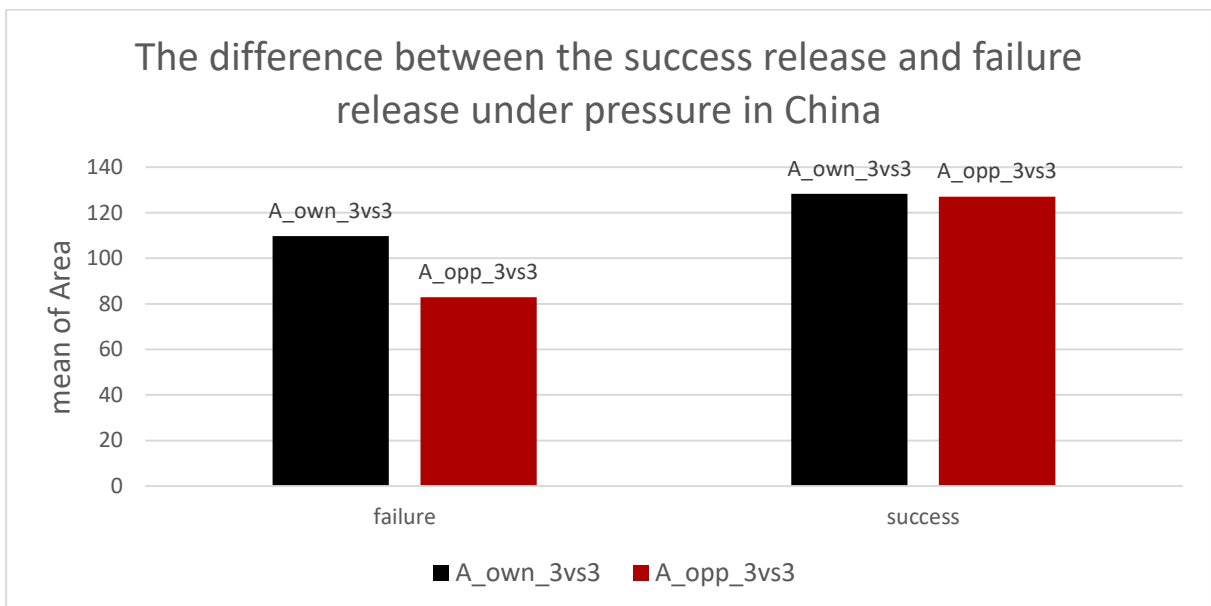


Figure 43. The differences in the area sizes covered by the player with the ball and his nearest two teammates (A_own_3v3), and also in regard to the area sizes covered by the nearest three defenders of the opponent team (A_opp_3v3) in failed and successful pass actions in the 3v3 situation in the Chinese U17 youth soccer games

Similarly, we also plotted the mean histograms of the area size formed by the athletes in the 4v4 and 3v3 samples situations in the German U17 youth soccer games (see Fi

g. 43 and Fig. 45). Both Figures 43 and 45 underline the difference in the game behavior on the pitch between the Chinese and German U17 youth soccer games. The average values of the area size variables A_{own_3v3} and A_{opp_3v3} in the German sample were larger than the average measures in the Chinese games, indication a higher game pressure in China or a better player distribution in Germany.

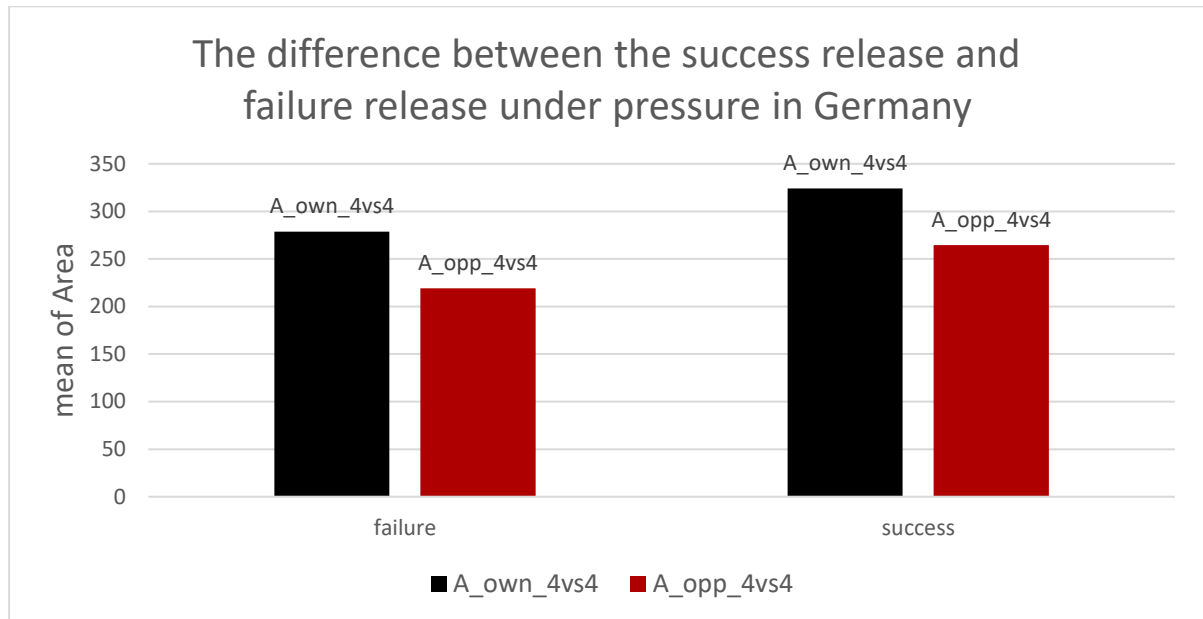


Figure 44. The differences the area sizes covered by the player with the ball and his nearest three teammates (A_{own_4v4}), and also in regard to the area size covered by the nearest four defenders of the opponent team (A_{opp_4v4}) in failed and successful pass actions in the 4v4 situation in the German U17 youth soccer games

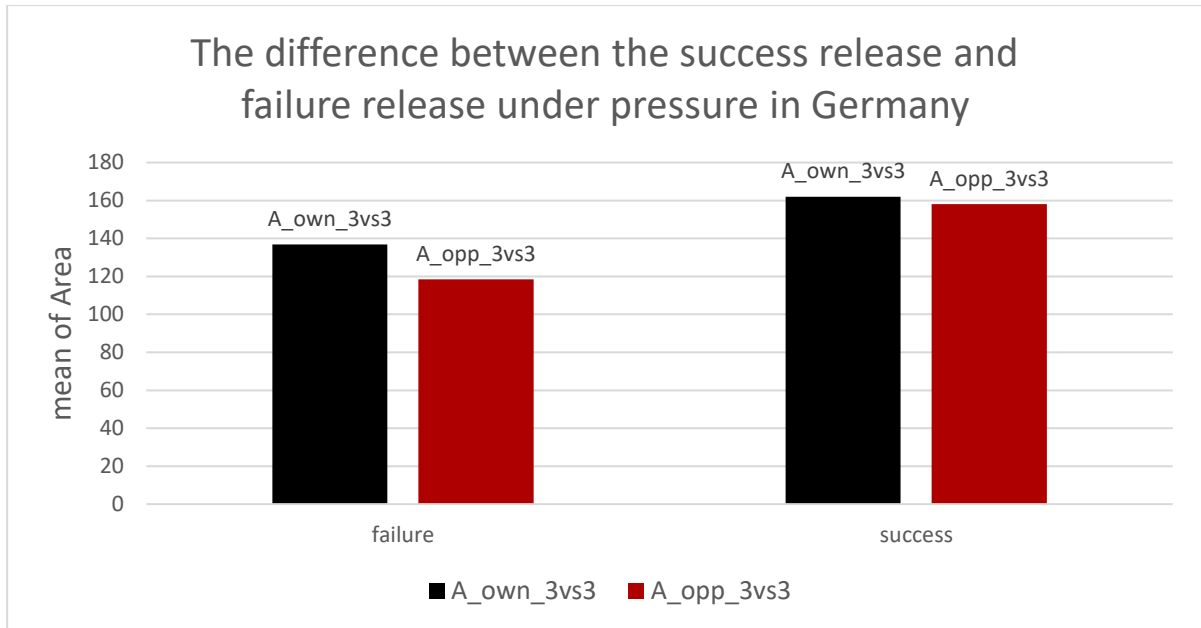


Figure 45. The differences in the area sizes covered by the player with the ball and his nearest two teammates (A_own_3vs3), and also in regard to the area sizes covered by the nearest three defenders of the opponent team (A_opp_3vs3) in failed and successful pass actions in the 3v3 situation in the German U17 youth soccer games

4.2.6 Summary of the pressure results in German and Chinese U17 youth soccer games

In order to express the research results more intuitively, the research results are entered into the following table. The red dot represents saliency.

Table 38. Comparison of 4v4 differences between China and Germany

	German U17 Soccer Games				Chinese U17 Soccer Games			
	4v4 Total area	4v4 Own area	4v4 Opp area	4v4 Distance to Opp	4v4 Total area	4v4 Own area	4v4 Opp area	4v4 Distance to Opp
Game time				■	■	■	■	■
Game score	■			■	■	■	■	■
Game state	■	■	■	■			■	■
Game zone		■		■			■	■
Game release	■	■	■	■		■	■	■

Table 39. Comparison of 3v3 differences between China and Germany

	German U17 Soccer Games				Chinese U17 Soccer Games			
	3v3 Total area	3v3 Own area	3v3 Opp area	3v3 Distance to Opp	3v3 Total area	3v3 Own area	3v3 Opp area	3v3 Distance to Opp
Game time			■	■	■	■	■	■
Game score	■	■		■	■	■	■	■
Game state	■	■	■	■		■	■	■
Game zone			■	■			■	■
Game release	■	■	■	■	■	■	■	■

5. Discussion

5.1 Descriptive statistics

By analyzing a total of 4,503 data, we can see that the area formed by the players on the field is different. From the fact that the area of the team members is larger than the defensive area, it can be concluded that the team members have been making a change about the area of the sport field in order to attack and produce scoring opportunities, trying to expand the area of the game area. Increase the defensive player's running, to achieve the effect of weakening the opponent's defensive density, create opportunities, and penetrate the opponent's defense.

According to the 4v4 and 3v3 defensive situation, the defensive area of the four players has always been smaller than the attack area of four people. This is also the essential element of defensive, contracted defense, and stable defensive formation. The goal is to let each athlete take up the responsibility. Maintain a defensive position and then block the offensive channel of the offensive. The oppression caused the attacker to not tear the defense smoothly, finding a route that directly penetrated the middle or sideline attack, forcing the attacker to release the ball to both sides of the court to compress the offensive space, effectively reducing the chance of scoring, and changing from a decisive steal to a sidewalk, which can effectively improve the success rate of steals.

The overall sample size is 4,503 scenes of releasing the ball. Each scene consists of two parts, one is to receive the ball, and the other is to release the ball. Whether it is the average or standard deviation of the area, or the minimum value, the difference between them is huge, and the data is substantially dispersed. It shows that the situation on the field has been changing. It has not been implemented according to a tactical policy. It will change according to the changes of players on the field. There is a huge gap between China and Germany in the level of football development.

There were 1278 4v4 (same as 3v3) confrontation scenes in two games in China, with an average of 639 scenes per game. In Germany, there were 3,225 4v4 (same as 3v3) confrontation scenes in four games, with an average of 806 scenes per game. More releasing balls represent more players running, and the interaction between players is more frequent. This is a high level of performance for players, and the overall offense is more coherent. The Chinese athletes are averaging fewer releases per game, less

interaction between players, no team members running, and unable to achieve offensive coherence.

In the 4v4 and 3v3 area, the area of Chinese offensive players and defenders is smaller than the area of the German team. During the organization's offense, the team needs to run without the player's position to open the defensive line of the defender, thus creating space for the team member, allowing him to break through or better release route. Small, the room for choice is smaller, and sometimes it is caused by mistakes in the movement of one's person. China's release success rate of 87.4% of the German team's overall release success rate of 86.9%. The success rate is similar, indicating that there is no difference between the two teams in the basic performance of the conduction ball. However, the Chinese team needs to learn from the German team. When German athletes are in a wide range of offenses and releasing, usually the adjacent teammates will quickly widen the width of the attack and create space for the player's vision. Open and easy to release, to organize a smoother attack. Chinese athletes are standing in the same place, do not know where to run, will always be inconsistent with the idea of teammates, which is also an important reason for the number of releases and the attack is not smooth.

In terms of defensive distance, Germany's average value of 5.473m is higher than China's average of 4.574, indicating that on the defensive end, German athletes pay more attention to controlling the safety distance of the team members and defending their defensive range. As in the case of Chinese players, once the distance is too close, the defensive players will be robbed, but in the same level of the game, the defensive side is at a disadvantage, once the defensive position is lost, it is easy to be attacked by the ball breakthrough or form more and less. The normal choice is to maintain defensive distance, delay the opponent's offense, wait for the protection of teammates, and find opportunities to get the ball. This is the reason for the football concept that Chinese athletes need to learn from German athletes.

After the failure of the European Cup in the European Cup in 2000 and 2004, it was called the dark period of German football history. Then, Germany began the German football reform led by Klinsmann and Loew. After ten years of reform, it has made significant progress and returned to the peak of world football. The bottom-up hard work and hard work of this decade have finally paid off. However, comparing Chinese football with German football, neither the reform of the Football Association system nor the in-

novation of the youth training system failed to meet expectations. The number of players is far less than in Germany. The establishment of the coaching team is also rough. In 2017, China sent the most energetic U20 Chinese national team to participate in the German TSV Schott Mainz competition. However, even in the face of the Regionalliga Southwest team, this team is far less potent than the German national team U20. The Chinese team still lost the game 0-3, the team did not get the ball, even if it can occasionally get the ball, did not organize any effective offense, or even a threat to the opponent's goal. It is also because of this that the next game will be canceled. What is scary is the determination to fight Chinese athletes. Seeing such a gap may make them languish. Even so, unexpected things happened after the Chinese team returned to China; they gave up their football career. Therefore, it is imperative to study and understand the difference between German and Chinese football. Learning from good learning will give Chinese football a chance to breathe. We will make a descriptive analysis and statistics of the data after sampling the data, which can provide a reference for the study of the following conclusion, to select reasonable statistical research methods and find the subtle laws existing in them.

5.2 The relationship between competition time and pressure

The 80-minute U17 game is divided into eight parts, each comprising 10 minutes. According to statistics, there is an increase in the pitch area from the offensive side or the defensive side, and we will analyze the reasons for this situation from two aspects.

In the overall sample of China and Germany, it can be seen that the total area of 4v4 and the area of the attacker in 4v4 gradually increase with time, and the T values reach 4.961 and 3.981 respectively, and the athletes' feelings of pressure also rise significantly. However, although the area factor of the four defenders is positive, the positive effect with the game time is not significant. This also shows that the defensive area has less effect on the improvement of athletes' pressure. However, it cannot be ignored that as the game approaches, the distance between the nearest defender and the player is significantly reduced, which will significantly increase the pressure on the athletes.

From a separate sample to compare and analyze, Chinese athletes have a significant influence between competition time and area, including defensive player distance. As time goes by, the pressure felt by the athletes is more prominent. It has been shown that in the continuous advancement of the competition. German athletes can always maintain a basic state of play, and the various data variables do not fluctuate too much

over time, with no significant differences. It can behave almost the same as just starting. Because it does not change the efficiency of offense or defense because of the change of time, it still maintains a skill and tactic like the beginning of the game. At this point, German athletes are significantly better than Chinese athletes (See Table 12 & 13).

The first is the offensive side. When the second half gets the ball on the offensive end and organizes the offense, the formation is enlarged. This is correct in normal tactical thinking. It should be to enlarge the area of the attack and let the teammates and themselves pull the distance. To make the most of the width of the stadium to create a neutral, break the defensive side of the defense, and thus opportunistic penetration, promote the overall formation, but we must pay attention to another set of data, in the second half, the number of releases is much smaller than the first half. That is to say, although the offensive lineup has been opened, the number of releases has not been improved, it can be judged that there is obviously a shortage in the running and receiving of no team members, resulting in fewer releases or high quality. The release is fewer. At this point, China and Germany have shown a consistent phenomenon, and the reason for this phenomenon is because it is due to physical decline. The decline in the synergy between teammates and the low contraction and flexibility of the formation. This has led to a lower threat to the offense. A good team is doing an excellent job of releasing the ball. Maintaining a reasonable possession rate is a critical factor in winning. It can judge that the pressure on the offensive end is gradually reduced as the game progresses. However, observing the data of 3v3, we know that the second half of the game, whether it is offensive or defensive area, has a decreasing trend, which is caused by the decline of physical strength, in addition to shrinking the defensive range, increasing the success of the rush. The rate, which forces the offensive side to close the distance, to create a passing space for teammates. This point can also be seen from the change in distance, the defensive distance in the second half is also showing a trend of shrinking.

Secondly, the defensive area in the second half is also slightly larger than the first half. The basic principle of defense is to defend the principle of closeness. The entire defensive team has a sense of layering and can complement each other and help prevent the emergence of a situation with less defense. After the failure of the attack, it is necessary to return to the position quickly, or the teammates come over to help defend, makeup because the defensive loophole caused by his mistakes did not leave a gap in the opponent to form a breakthrough. However, in the second half, the formation of the

entire defensive team is getting bigger. This means that when the players are defending, there are no teammates to defend their defenses adequately. Everyone's position is enlarged. If they do not help teammates to cooperate, then in 4v4. In the offensive and defensive, it is easy to be broken, and the opponent is beaten into a small match to achieve the purpose of tearing the line of defense. This is precise because of the passage of time, the physical exertion cannot complete the high-quality defense like the first half, but also because of the lack of concentration of the spirit, the concentration of the game is reduced, and the fatigue is increased. Cannot be as defensive as the first half. Therefore, the level of pressure caused by the opponent is also declining. Increased fatigue and cannot be as defensive as the first half. As a result, the level of stress on opponents is also declining. After a half-time break, the size of each indicator of Chinese athletes is increasing, and it is impossible to complete a good contraction defense. After the German team athletes have experienced the final break, the area of the indicators in the second half remains the same as the first half. The curve changes, even the defensive end is more persecution, shrinking the defensive end area, it can still implement the established tactical play. In this regard, the German team athletes overall are better than the Chinese team athletes.

This is also caused by constant changes in the tactics of modern football. Modern football has been working hard in the high position. In the past, most of the tactical use was when it was behind, or when the score was behind. In order to regain the disadvantage, a kind of kicking method has to be adopted, but now with the improvement of athletes' physical fitness and the upgrading of tactical styles, more coaches hope that at the beginning of the game, both athletes are not sufficiently active. At the time of the high-level tactics, trying to play a fast oppressive defensive and offensive, so that the opponent has not enough to adapt to the pace of the game, quickly establish the advantage. The widespread use of this type of play is also a direct result of the athlete's physical exertion in the first half is huge. Even after a short break, it is difficult to maintain high-quality teamwork.

Besides, it can be seen from a distance between the defenders and the players. As time goes by, there are wave-like changes. After the first half of the first half, the defense begins to gradually oppression, and then a period of relaxation and then again oppress, then relax again. The description is in line with the athlete's physical function response cycle. Every time the high-intensity smashing is brought about by the massive consumption of physical energy, it will enter a low-intensity defense for a short period of

time. This can be seen in the competition between Germany and China.

Chinese athletes like to take the looting method to defend and get on the rush when they first start. This kind of play is much used in the high-level European League at this stage and also received some miraculous effects. However, this requires the cooperation of the team and the rules and regulations to create effective defensive steals. Each ring is closely linked, and it has a solid foundation and consciousness to support.

However, Chinese athletes imitate from a single level, but they consume their physical strength in vain, and they have not achieved the effect of this tactic. Even if it is intercepted, the processing after getting the ball is rushed, and it is random to solve the next step. This causes continuous mistakes. As can be seen from the area, the overall situation is showing a weaker defensive posture. Whether it is the offensive side or the defensive side, the area is gradually enlarged, which is related to the consumption of physical strength. In particular, losing the ball, more concentrated in the second half, a variety of unexpected goals appear one after another. The uneven distribution of physical strength causes it.

In comparison, the German team's performance in the regular game has been entirely satisfactory and has been implemented by the established style of play. We can see from the changes in surface area at different periods that there have been no vast fluctuations. It shows that in the 80 minutes of the whole game, there is a reasonable allocation of physical strength, and the defensive intensity and density of the coach arrangement are well implemented. The team that has always been strong, why can it remain strong as always, precisely because of the reasonable arrangement of tactics, and the correct implementation.

From the offensive end, the players have always been flexible, according to the position of their team members to carry out the position, no matter where the release to any position, the three nearby players can open the gap in time. Create space and keep a safe distance. In other words, from the defensive end analysis, it is possible to keep the size of the four nearby defenders unchanged. Due to the change of the overall formation, the overall defense changes with the movement of the ball. From these two points, it can be seen that the gap between the Chinese team and Germany team is undeniable.

5.3 Compare the different pressure levels of the team in the lead, tie and behind

First of all, we will classify the situation in these three scenarios in the six games, observe the different stages of the game on the field, and the different performance of the team; it can be seen that when the score is behind, the oppressiveness of the offense is not stable, there have been many releasing mistakes, and the defense has appeared loose; and the score is a bit more positive than the lead, I want to change the form on the basis of the current, so on the offensive both the end and the defensive end must be more active, the teammates contract better, and the off-ball running becomes more. When the game is a draw, the offensive side and the defensive side will not have large fluctuations, and will tend to be in a state of balance, and will remain in a particular range without significant changes.

In terms of defensive distance, there is no significant difference in German athletes under any circumstances. However, Chinese athletes do not have significant differences between tie and lead, and the rest of the situation was significantly. It shows that Chinese athletes cannot implement the established skills and tactics and appear personal behavior when facing different situations on the field.

Analysis of the German game, in the 4v4 and 3v3 area, most of the time did not show a significant difference between behind the tie, $P > 0.05$. However, there is a significant difference between the split and the lead, $P < 0.05$. This is a very interesting phenomenon. In contrast to the Chinese game, in the 4v4 and 3v3 areas, most of the time, there is a significant difference between the backward and the Peace Bureau. $P < 0.05$. However, there was no significant difference between backwardness and lead, $P > 0.05$.

When the score is behind, the performance of the defensive end is positive except for the consistency. Each defender is closer to the position of the player than before. In order to steal the ball in the first time, break the opponent's offense. The party can quickly organize the offense, or destroy the opponent's release, reduce the opponent's release quality, and create opportunities for the player's steal. They are presenting an increasing trend. In the draw, all indicators are in the middle. So we can know that when the team lead, the team's state shows a low-pressure feeling, all indicators are not as good as the draw and behind, which is due to the direct impact of the lead, psychologically in one relatively relaxed state, which caused the releasing error, the defense is not in place, and so on.

When Chinese players are behind, the defensive and offensive aspects of the accumulation of changes are significant, when the absolute value of the difference is small, the overall trend is rising, the pressure is stronger, and the pressure on the athletes is also the most intense. In Germany, when the absolute value of the difference is small, the overall state is consistent with the previous one. The attacking party and the defending party do not change much. The overall curve shows a gentle trend, and it indicates that the athlete will not be too big because of the change of the score. The pressure on the athletes has not changed much. This point, the German team is better than the Chinese team. The players will not have a large fluctuation due to the change of the score. In order to reverse the situation, they will blindly fight and consume physical strength. Both the offensive and the defensive will perform according to the established skills and tactics.

When the difference is turned from negative, the distance between the player and the defender gradually shrinks and approaches approximately 5 meters, which is also close to the mean of the descriptive statistics. At this time, as the score increases, the athletes will be more focused on winning, the on-site tension will increase, and the athlete's pressure level will also rise.

Comparing the Chinese and German samples, the changes in the size of the athletes formed under different points are the same as the overall sample. When the absolute value of the difference is small or at the critical moment of winning or losing, the rising trend of all variable is more visible, and the athletes feel more intense.

China and Germany generally maintain a situation in which the defensive area is always smaller than the attack area. Moreover, the overall trend does not change significantly because of changes in the score, and overall it remains the same. However, as can be seen from the figure, the fluctuations of Chinese players are relatively large. When the points difference changes greatly, the offensive players and the defending players will have different rhythms from the previous ones. Here, the psychological fluctuations of the athletes and the on-the-spot changes of the coaches. Adjustments occurred in time, but from the results of the competition, the results were minimal, which increased the consumption of sports but did not play a useful role. This may be caused by many factors.

An overall situation is that as the score gets closer, the area of offense and defense is getting smaller and smaller, indicating that everyone is in a state of slack. This point was not found in the German team. When there is a large difference, it is still at a certain

level, and there is no huge fluctuation, all within the scope. The only difference is that when the difference is getting bigger and bigger, the attack area of the leading party will be further enlarged. This can be considered to increase the width of the game, and it can make full use of the space of the stadium. Because it is leading, can create better. They are releasing the ball, slowly looking for offensive opportunities, not rushing for a momentary attack. When the score starts from the draw, the Chinese team's offensive and defensive areas will show a significant trend, indicating that the offensive team is expanding the scope of the offense, trying to create the offensive space by opening the defensive player's density, thus gaining the scoring opportunity, the defender The team also increased the defensive range and increased the pressure on the court. The German team players will start to draw off the offensive and defensive areas at the beginning of the draw, but the trend is slower, indicating that there is no obvious change in skills and tactics. The defense is still a way of shrinking defense, but the scope of the attack is slightly increased. Therefore, when China and Germany compare when the score changes, the offensive shows an expanding trend, which is the same. However, there are differences in the defensive side. China will increase the number of tactics and expand the defensive area. The German team athletes will maintain the previous defensive range and will not easily change. At this point, Germany is better than in China. Will not blindly change the defensive strategy, to fight, resulting in massive consumption of physical strength, which will quickly lead to defensive misplacement — the opportunity to be caught by the opponent.

5.4 The difference between releasing and receiving the ball

From the data, we can know that in the 4v4 and 3v3 confrontation, whether from the offensive end or the defensive end, the area of the receiving ball should always be larger than the area when releasing the ball (See Tab.20). Because when holding the ball, will face the interception and oppression of the defenders. At this time, it needs to observe the position of the teammates, then choose the correct release route, and make sure that the opponent will not break the release. The ball must also ensure that teammates can quickly receive the ball. These are all analyzed in a short time and then judged. Moreover, when it is known that the defensive player wants to steal his ball and because the area of 4 people at this moment is less than the end of his release, the team member will get the area of the ball after the ball, so give him The space chosen will be smaller, so this time he must do the right thing. The pick-up player only needs to

get rid of the defensive players around him, find the neutral, and get stuck in the position so that he can receive the release smoothly. Therefore, the arrangement of the workload is far less than the team members. In the defensive distance, the distance between the German player's release and receive is 2.061, the distance between the China player's release and receive is 1.117. Chinese athletes should learn German athletes. In the face of releasing and receiving the ball, defenders should adopt different defensive methods and defensive distance, which is more conducive to improve the defensive effect and thus obtain the ball.

Moreover, in the comparison between Germany and China, it is not difficult to find that all the data of Germany is higher than that of China. It shows that the variation of athletes on the field is higher than that of Chinese athletes, more releasing and running, and no team members running. This is the other side of the Chinese athletes who need to learn. Habitually standing in the same place or not knowing the correct off-ball position, space for the teammates to open the offensive has always been a drawback of Chinese athletes. From the data of the releasing ball, it can be reflected, both in terms of the number of times, and the success rate is weaker than the German athletes.

Judging from the number of releases and the number of receives, although the games are different, it can be seen that the average number of releases (432) and the average number of receives (374) of the German team is significantly higher than that of the Chinese team. 290) and the number of receives (350). The Chinese team has more receiving than the number of releasing, indicating that everyone is losing control of the ball. After the process of scrambling for the ball, they first failed to release the ball to their teammates immediately, resulting in being intercepted by the other side. This is also the reason why the number of receives is greater than the number of releases. Judging from the consistency of the actual situation observed when collecting videos, Chinese U17 players are far weaker than German U17 players.

Besides, the essential point is that when the Chinese team released the ball and received the ball, there was no significant change in the 4v4 area on the defensive end and the offensive end. The players on both sides did not change significantly, and the standing-pick method resulted in the releasing of the ball. The increase also makes the fluency of the game significantly reduced. Modern football is increasingly testing football players to handle the ball reasonably, and the timing and strength of the ball are appropriate. As the looting becomes increasingly fierce, the speed at which a player has a ball is also required to be faster and faster. In order to be reasonable, fast and accurate,

players not only need to develop the habit of observing the situation in advance, in order to pre-judge the route of the ball in advance, but also need to have the ability to think independently, in order to make the ball to which teammate is most reasonable — decision making. According to the video of the game, the player's off-ball running and less of the four athletes, only one or two athletes participated in the team conversion and carried out a series of teammates and other teammates. Also, in most cases, an athlete will change his position by running without the ball. This is a problem encountered during the training. It does not move on its own, not because of their subjective laziness, but because the athletes do not know where to go to deal with teammates, that is, the ability to interact with each other is extremely poor.

On the other hand, when German players start to release and receive the ball, usually four athletes, including releasing players, will move collectively and will start moving in the next second release to open up space for the players. Avoid too many defenders to the double team, four people is a complete event, so there are many changes, which is more conducive to the next release. Why every team, every player can do this, of course not only because of the hard work of the players on the court, but also the supervision of the excellent coaches.

First of all, the ball-free running is divided into the off-ball position during offense and the off-ball position when defending. There is no ball in the offensive position. No team member should run to the unmanned and empty ball route without being blocked so that the ball can be safely caught. Players must have the ability to find space and the ability to create space. It is necessary to find that the air needs to develop the habit of observing the situation on the field in advance in order to make a pre-judgment. For the striker, the ability to find the most threatening air is needed, which is more important than shooting. If there is no gap around, it should pull the defenders through active running, in order to create a void for the teammates, which requires the players to have some creativity, and the tacit understanding between teammates is also important. The main purpose of the defensive movement is to compress the opponent's releasing space and shooting space as much as possible. In addition to forcing players, other defenders should always block the opponent's releasing ball route.

If the opponent behind moves, they must follow the move to ensure that the release will not be missed. The route is given to the opponent so that even if the team member fails to grab the ball, the opponent does not have a route. This requires players to develop the habit of observing the situation behind and around the situation.

At present, Chinese football players are doing poorly at this point. They always watch the ball without looking at the people behind them. Most of the conceded goals are derived from this. On the basis of the above, we must mention the awareness of co-defense. The essence of Italy's chain defense and Atletico's linkage defense lies in the team's sense of co-defense.

When the party is in the vicinity of the restricted area or the opponent has advanced to the vicinity of the penalty area, the player who is closest to the ball must go forward to grab the ball to delay the opponent's advancement. At this time, other players should follow up quickly and ensure that one player stands in the first place. The defender is behind him to protect the second defensive layer so that even if the first player is over, the second player behind him will follow the ball and the second will be over. A third player followed up to grab the ball, which formed a layer of defense, making it impossible for the opponent to advance to form a shot.

From the above points, the overall strength of the German team is better than that of Chinese football players. The reason is precisely that Germany's complete youth training system, starting from the early childhood stage, is mainly to cultivate interest, using four points: the first is simple running practice, the second is simple ball practice, and the third is small ball game ball. The fourth is a small football match. This part of China is missing in the training of young people.

From these points, different teaching and training methods can be spread out, but the underlying themes are consistent. Therefore, when each young person is trained, it is basically a football concept produced under the mode teaching. In the use of small venue competitions, the 4v4 mode is also fully utilized. Therefore, in a small range of cooperation, a good foundation for the foundation. The gap in China's youth training has always existed. Although it has changed in recent years, it is still far from the development of Germany. Chinese football can learn from these four points. Do not emphasize the professional practice when the athletes of early ages start to contact football and fix the children in a frame. Dispel the child's enthusiasm to continue learning

It can be seen from the data of the distance of the defenders that during the releasing and receiving stages. The distance between the German defensive players and the team members is greater than the distance between the Chinese team's defensive players and the team members. German athletes pay more attention to the overall defense, the maintenance of the overall formation, not rushing to grab the style of the German team. Chinese athletes generally prefer a close-fitting defensive, so the pressure on the

team members is greater, and they will be intercepted again when they just got the ball. This can explain why Chinese athletes often have the right to exchange the ball, and the number of receives is higher than the number of releases. In the defensive part, the Chinese players only compete for one-on-one competition, which is difficult to achieve in the case of close strength. Should learn the German team's approach, take the one-on-one ball and block tackle. Chinese athletes are generally inclined to defend their position, but will not be able to target teammates to mark other players. The disadvantage of one-on-one ball grab is that only the player closest to the ball approaches the team member, directly stretches the ball, or uses physical contact to make the team member lose control of the ball and then grab the ball. It is important to note here that in the process of approaching the team members, it is necessary to avoid leaking the releasing route to the opponent. Therefore, it is necessary to approach the releasing route quickly. In general, unless the opponent's ball and ability to get rid of is not durable, it is difficult to grab the ball one by one, so it is usually to destroy the space of the opponent's releasing ball and the accuracy of releasing, and the speed of forwarding. The German team made full use of the ability to rob, also known as robbing or double-teaming. It means that many people (two or more) take turns to grab the ball. First of all, the few players who are closest to the ball will be surrounded by the team members, so that they cannot get out of the ball. The first team will be forced to grab the body and use physical contact to make the team members lose control of the ball. The second one, the player, will then snatch the ball. If the first team member is rid of the team member, the second team member should immediately follow up and rob, so loop until the ball is grabbed. In this process, it should be noted that players who are not engaged in physical grabbing should always seal the releasing ball route. There is a high probability that the wheel can grab the ball (Tang, Chen, Liu, & Xu, 2001).

Chinese athletes need to learn from the German team in this aspect. The athletes are more flexible and unconstrained. They have their own ideas. When organizing offense and defense, they can fully observe the form on the court and play their best. To contribute to the team.

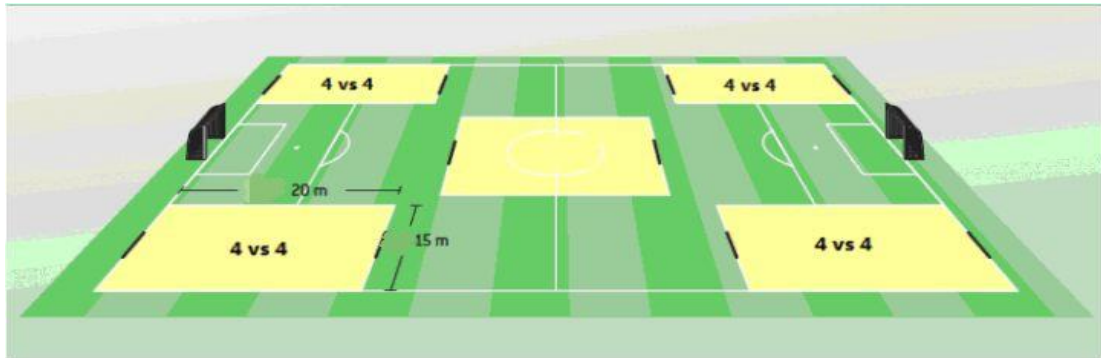


Figure 46. Schematic diagram of German youth 4v4 field training (Tang, Chen, Liu, & Xu, 2001).

5.5 Compare the difference between the 30-meter area and the midfield

We divided the course into three parts according to the distance of 30 meters from the goal and the division of the midfield.

According to Tables 26–31, the total area of eight athletes and the area of four ball-bearing players in the 30-meter area are less than the total area of eight people in the midfield and the area of four ball-handed players. When comparing the area of four defensive players, the defensive area in the 30-meter area is smaller than the defensive area in the midfield. And recently the distance of a defender from the team is also less than the defensive distance in the midfield. The difference between A_{own_4v4} and A_{opp_4v4} in the two groups is significant ($p < 0.05$), indicating that the area formed by the athletes in the frontcourt position is larger, and the distance between the team members and the defenders is smaller. This result is consistent with the actual situation but also reflects that the athletes in the frontcourt position may face more excellent receiving and scoring pressure. This is an analysis based on the overall sample size.

The German athletes' competition data and the Chinese athletes' competition data are analyzed separately. As shown in table 26-31, it can be known that when China compares the midfield and the 30-meter area, the midfield indicators are greater than 30. The rice area, which includes the difference in area and distance. In the 30-meter area, the range of offense and defense is further narrowed, and the distance between the defender and the offensive player is further increased, indicating that the closer the goal is, the more intense the player is. The density of players per unit area is greater, which is not conducive to a good pull space, forming a shot. In contrast, the data performance of the German team. In the midfield area, the offensive area is greater than the 30-

meter area. In the defensive distance, it is consistent with the Chinese team. The average distance between the defenders in the 30-meter area and the team members is 4.68m, which is less than the average midfield defensive distance of 5.80m. For the two subsamples, the average value of the Germany sample is 5.473, which is higher than the mean value of the China sample is 4.484, and there is a significant influence ($p < 0.05$). Explain that the pressure on the defensive end of the athlete in the 30-meter area is significantly greater than the pressure on the midfield. As shown in Table 38: Chinese team athletes face a defensive distance of 3.60m in the 30m area, while the German team faces a defensive distance of 4.68m in the same area. The Chinese team athletes face more pressure than the German team — the same regional pressures. In the midfield, the Chinese team faced a defensive distance of 4.77m and the German team's defensive distance of 5.80m, which kept the overall consistency. The Chinese team pays more attention to the people's defensive defensiveness, hoping to break the ball with one's strength, and the Chinese team's defensive players will quickly rush to grab, lose their defensive position, and ignore the situation of the offensive players plugged in behind. The German team athletes pay more attention to the overall defensive tactics, using a variety of ways such as one-on-one steals and rounds of robbing, to cooperate with the defensive end, will not quickly lose their defensive position, the entire line of defense is not prone to loopholes, Defensive or defensive counterattacks are more efficient.

We analyze the data to know that the 4v4 and 3v3 area in the front field of the offensive side is the smallest, and the player's position is the closest. At the same time, the defender has the most defensive participation in the 30-meter area of the backcourt. It has caused tremendous pressure on the offense and releasing, and also resulted in a low release success rate. But there is an interesting phenomenon that the German in the A_tot_4v4 area in the offensive area is larger than the midfield area, but A_tot_3v3 are is still less than the midfield area.

Whether it is the offensive or the defensive side, the 30-meter area in front of the door is the hardest-hit area. This place is the most dangerous area from the goal. As a professional athlete, it is an effective range within 30 meters, and due to the existence of the large restricted area, it is necessary to pay attention to the range of action and reasonable physical confrontation in the defensive. Otherwise, it is easy. Will foul, give the opponent a penalty kick or a threatening free-kick. So, for the defensive side, this is the area that cannot be retired, the last line of defense that must be held, and for the

offensive side, here is the treasure of the advantage of expanding the score, so the confrontation in this area is the most intense.

The line of defense is shrinking all the way, and the opportunity for the opponent to easily break through the line of defense is not allowed. It is generally built by two layers of defensive players. And the distance between them will be close, in order to make a timely and complementary defense. Moreover, in this area, everyone's attention has been raised to the extreme, for fear of a little mistake. Therefore, the handling of the ball is also careful in a physical confrontation, do not want to waste a good scoring opportunity. The defensive side is also sloppy, waiting for the opportunity to destroy the opponent's offense, and quickly organize counterattacks. This tactic is tried and tested on the weak team. As the offensive side is almost full, the backline is empty. Once the offense is not made, no opponent seizes the opportunity, uses the fast release or long release, and fights back, then the backcourt is dangerous, facing the opposite striker is fast, not easy to deal with. It can also be seen from the success rate of releasing the ball. The grabs received within the range of 30 meters in the front field are the biggest, and the turnover rate is high.

The defensive intensity of the opponent is not enough to achieve the perfect way to play. Teammates will also receive resistance when they receive the ball. These characteristics are the same in both German and Chinese athletes. Showing the same characteristics and trends.

5.6 The difference between the success release and fail release under pressure

According to the results, it can be known that the German athletes and Chinese athletes maintain the same characteristics. When the release is successful, the average value of the total area of the eight athletes or the area of the four offensive players is greater than the indicators when the release fails. It shows that expanding the area of the attack will help improve the success rate of releasing, giving the player enough space to pull the defensive space. At the same time, the area of the defending team will expand simultaneously with the expansion of the attacking team. At the same time, the defensive area will be reduced, but the release success rate will be reduced, so from an offensive point of view, it is still necessary to expand the scope of the attack as much as possible to improve the release success rate. It is more obvious from the defensive

distance that when the release is successful, the average defensive distance is 5.44m, and when the release fails, the average defensive distance is 3.729m. It also benefits from the offensive player's wide range of offense, making the distance between the defender and the player's team larger, and providing a higher release success rate.

Regardless of the overall sample or the separate analysis of German data and Chinese data, there is a significant difference in the distribution of the indicator values. When the offensive range of the four offensive players is reduced, the defense is simultaneously reduced, and the defensive distance is simultaneously reduced. In this case, the pressure of the ball-bearing player is significantly increased, and the releasing error occurs. The difference between successful releasing and releasing mistakes in Germany and China is significant. For the releasing of the mistake, all areas are smaller than the successful release. The release for the mistakes is due to the oppression of the defensive end, resulting in a smaller area of the ball, unable to pull out space, resulting in a release error. Here we divide the releasing errors into three situations. One is the ball out of the ball, the defender is disturbed, and the scientific goal is not made. The second is that the defender stops when the ball is running. This is also due to release mistakes. Before releasing the ball, did not observe the careful releasing route and defend the player's position. The third is that the receiver cannot get the ball smoothly, causing additional one-half of the ball, which is also classified as a release error.

From an offensive point of view, the larger the 4v4 and 3v3 area, the better it is to release the ball, and the vision is more open. The pressure exerted by the defenders becomes smaller and can be attacked or released or rid of by various means. In this respect, German and Chinese athletes are consistent. It can also be seen from the change of the distance that the release success rate will be much higher in the case of a large distance, and the pressure on the defensive player is small, and it is possible to take the ball with ease and have a direct relationship.

From a defensive point of view, in the defensive formation of German athletes, the defensive side will shrink as a whole, and the position of the two midfielders and the position of the defender will also approach the middle to prevent the players from being too scattered. Unable to form an effective collaborative defense. However, due to the reason of the venue, the offensive side tends to let the players on the sideline approach the sideline as much as possible, and open the width of the formation, destroy defensive density. This results in insufficient defensive pressure and cannot effectively block the releasing route of the player. Moved back and forth by the opponent through the release

and the neutral position. In the defensive formation of Chinese athletes, the overall trend tends to move closer to the middle, because the number of offensives to the side of the attack is minimal, and more tend to organize attacks in the middle, but the middle is the area with the largest number of defenses and the highest density. Therefore, it will cause frequent ball loss and frequent exchange of ball rights. Even in the part of the Chinese team's successful release, the defensive distance is 4.753m, which is far below the defensive distance of 5.713m when the German team successfully released the ball. Not fully utilizing the width of the court to organize the attack is a shortcoming of Chinese athletes. It is necessary to learn to release the ball to the side in the future game. However, Chinese football players who receive the ball on the side of the ball once received the ball, and it is difficult to achieve a large ball because the defender's midfielder and the defender will form a double-team effect, blocking his releasing as much as a possible route. This kind of defense cannot be done in the middle. Therefore, it is easy to form an effective defense on the side of the road. It is necessary to let him release the ball back or cross the ball again. This way, while compressing the defensive area, he increases the pressure on the ball and forces him. There was a mistake.

5.7 The relationship between the results of the competition and the various data

By analyzing the variables when collecting data and finding the logical relationship between them and the outcome of the game, we found that the increase in area is still significant for the promotion of the game results. In the specific regression results of the single variables, we can also see that the p values after the regression of the four variables and the game results are equal to 0.000, indicating that the positive relationship between the area and the game results is extremely significant. So, we can absorb more of this result in the future game and increase the area of the attack, thus improving the winning rate of the game to a certain extent.

At the same time, the change of distance also shows positive effects. The defensive areas of different teams have a significant effect on their winning. For each unit raised, the winning percentage of the game will be increased to varying degrees. Their return value is 0,000, indicating that they both promote the outcome of the game.

In fact, when studying all the variables that appear in the game, our goal is not simply to find the factors that determine the outcome of the game or to accurately define a

value that determines the outcome of the game. Because the changes in the field are constant, subjective, and considerable factors are mixed. There is a famous saying that “soccer is round.” This sentence not only represents the shape of a football, but its deeper meaning refers to the uncertainty of the football game. Even if it prepares well before each match and the analysis after each game is meticulous, it is still not guaranteed. It can continue to win the next time. It is only to some extent to check for missing vacancies, to find problems, and to continually improve the process.

The road of football has been advancing—development never stops, excellent athletes emerge endlessly, and novel tactics and kicking methods are everywhere. We can only find the law in change, and seek innovative breakthroughs in the change, in order to always be the top of world football, representing the forefront of football development.

5.8 A comprehensive review of the differences between China and Germany

Germany and China are two different teams. One is at the top of the world football, has its own unique technical and tactical style, and several championship teams that have won various world competitions are the symbol of the most potent football culture. The other is in the middle and lower reaches of the world. So far, a total of 21 World Cup soccer tournaments have been held. China has been to one World Cup, and the other team scored nine goals against the Chinese team. This is also the only World Cup score for the Chinese men’s football so far, which is an unsatisfactory result. The need for China to learn from Germany is even more urgent. The overall analysis is divided into two levels: one is the comparison of football levels between Germany and China, and the other is the entire youth training system in Germany and China, which is often referred to as football reserve talents.

Germany is indeed a classic team with practical supremacy. Especially with the development of today’s football, the concept of physical supremacy and defensive supremacy has become popular. There is another important factor for their sustained and stable high level in the world competition, and that is their rigorous attitude toward the game.

German football is a power-type football, and it is a forever magic weapon for the Germans to be strong, stable, and time-tested. Through active running and overall advance/retraction to control the situation on the field, they will get a head start with a

steady stream of offensives.

Previously, Professor Li Bojie, a scholar who studied German culture, mentioned the importance of football to the Germans: "In addition to helping the Germans restore their self-esteem and self-confidence, football plays an extremely important role. This is to maintain and enhance Germany. Human country-ethnic identity" (Li, 2010).

From a subjective point of view, the style of German football does not have the sexy samba of Brazil, nor tango steps like Argentina, nor the gorgeousness of Spain. It is not even as intense as the thrill of England. Instead, under the conditions of body muscles, physical advantages can be maximized to the greatest extent possible. The German football style is prestigious, the attack is as unstoppable as a tank, and it is like a bomber. When the defense is like a meat grinder, it crushes the opponent, and it is as insurmountable as an iron wall.

Therefore, German football is also a typical representative of the so-called power football. However, this does not mean that the Germans do not understand the technique, The Germans' footwork looks rougher, and the locals can play a short release that is not inferior to the Latin football style, but it is still not achievable. In order to avoid weaknesses, German players are more likely to integrate their abilities into the team. The strength of the team is used to compensate for the inferiority of the individual's work. It is the integration of these outstanding technical players that act as a catalyst for the team, which makes the German football sublimate to the perfect combination of strength and beauty: mechanical aesthetics.

Followed by Lineker's old saying: football is a game of 22 people; the final winner is Germany (Galileo, 2019). This sentence is the best praise for Germany, but the so-called will is the embodiment of power and sublimation. The German team has repeatedly created miracles and significant reversals in significant events.

From August 2005 to the eve of the 2006 World Cup was the hardest time for the German team: Germany 2:2 Netherlands, Germany 2:0 Slovakia, Germany 1:2 Turkey, Germany 1:0 China, Germany 0:0 France (FIFA, 2019). The Germany media have criticized Klinsmann's new German team. On October 12, 2005, at Hamburg's home game with a small victory over China, the scene was embarrassing. Although it was a victory, it was more shameful than a defeat.

The German team have reached the World Cup finals eight times, won the championship four times, and advanced to the top four 13 times, second only to Brazil, ranking

second in the world. Germany also reached the European Football Championship finals six times, won the championship three times, and advanced to the top four eight times, ranking first in Europe. Moreover, the total goals scored by the German team in the World Cup and the European Cup is the first in history, showing the strength of the world's football.

With its deep heritage, excellent and stable performance, and advanced football concepts, the German team has led the world's football trends to be well received by the industry. In 1998, it was selected as the "Best Team of the 20th Century" by the British professional football magazine "World Football." In 1999, it was selected as the "Best Team in Europe in the 20th Century," the authoritative football magazine "French Football." The second selection of the German team as the "national team of the year" is a real European football hegemon (Soho, 2019). In the last five World Cups, the German team reached the semi-finals and created a new record in football. They won one championship, one runner-up, and two third runners-up. In the recent 2nd European Cup, they all reached the top four and won a good result from a runner-up.

Modern football is paying more attention to the rhythm of the game. Germany has always emphasized the tactic of quickly transmitting the attack while pressing the opponent to defend. Plus, the German robust yet flexible and technical play makes the game popular.

Germany's overall style of play has never stood at the top of the world. When the powers emphasized the classic front waist, Germany did not excel in the masters; when the Netherlands took the trend of full attack and defense, the Germans still had their rhythm; When Sacchi proposed chain defense, the Germans were still doing their own thing; when the horror of the winger era came, the Germans were still fearless. German-style, with the spirit of bright swords, has the outstanding quality of a desperate fight. When our domestic players participate in international competitions, they are often warned not to fight hard and not to be injured. However, in the World Cup, when the defenders frequently tried to intimidate the long-range shots of Barak and others, the German players did not retreat.

However, things are constantly changing and developing, and they are also constantly changing in the development of football. The German team unfortunately did not appear in the 2018 World Cup. From the basic formation, it did not keep pace with the times. Compared to the way the German team won the championship in the 2014 World Cup. Among them, the group stage used 4-3-3, 4-3-3, 4-2-3-1 formations, and the results

were good. However, in the three games of the three group matches in 2018, the 4-2-3-1 formation was adopted, and there was no variable. The opponents thoroughly studied it, and it was difficult to control the game as quickly as the previous World Cup (see Fig. 47-48).

team	Formation	frequency
Germany	4-3-3	4
	4-1-4-1	1
	4-2-3-1	2

Figure 47. The German team used formation during the 2014 World Cup.

team	Formation	frequency
Germany	4-2-3-1	3

Figure 48. The German team used formation during the 2018 World Cup.

In the 4-3-3 formation adopted by the German team in the 2014 World Cup, the side attack is the primary offensive means. The German team has no other strikers in the real world except Klose, but the influential midfielder has changed. The avant-garde is also more than free: The 4-3-3 midfielder plays a decisive role in the game and requires players with excellent offensive and defensive capabilities. Schweinsteiger on the 7th, Khedira on the 6th, and Cross on the 18th are four of the leading players in the 3-3-formation midfielder form the front and rear positions. On the backline, the two full-backs are responsible for defensive duties. At the same time, they are waiting for an offensive attack. The central defender also needs to participate in the midfield and frontcourt attack according to the form of the game. This requires the entire team to

have excellent personal abilities and tacit cooperation. The 4-1-4-1 formation is a high center. The midfielder has an important role in controlling the game. For the German team with a midfielder talent, it seems to be easy. 4-2-3-1 is the customary form of the German team who advocates offensive football. The two midfielders can assist the defender defense and can also be associated with the front waist. The avant-garde players can stand in parallel and can also form a standing position with the forward.

A team's overall ability to release the ball and control the game can be reflected in the number of releasing successes and the success rate of releasing. At the same time, these two figures are also critical indicators to measure the team's overall strength and technical and tactical level. With the continuous development of modern football skills and tactics, each team in the World Cup finals is the world's top-level in confrontation and defensive intensity and running position awareness, so it will inevitably lead to more and more limitations in the space of the game, each release is also because It is especially important to make full use of sufficient time and space.

In the seven games of the 2014 World Cup Germany, the number of releasing successes and release success rate were higher than those of the French team except for a slightly lower than the French team, especially in the group stage and the 1/8 finals. It can be seen that on the basis of guaranteeing a certain number of releases, the team with good releasing quality obviously shows stronger strength, and it is easier to control a game. Of course, this is not a decisive factor. For example, when the French team was met in the quarter-finals, the releasing times and release success rates of the two teams were comparable. Grasping the releasing opportunity became an important factor in determining the outcome of the match. From the point of release and success rate, the German team pays more attention to the overall style of play, and the players constantly cooperate with the ball to find more suitable offensive opportunities. Modern football pays more attention to defense, especially to the key points of the other party. Few teams use the individual ability of individual stars to drive the entire team's offense, showing the German team's overall play advantage. In addition, the number of releases in the game also indicates that the German team's offensive and defensive transition is fast, and the players have more chances to contact the ball, indicating that the German team's players have a high level of awareness and enthusiasm. The number of releases is a great influence on the control of the game's rhythm, the creation of opportunities, and the victory of the game. The results of these seven games also prove that the better a team's overall releasing skills, the easier it is to take the initiative, the more offensive

opportunities, the final rate of winning the game will be greatly improved for a team, to Wanting to get the ball, running is a necessary preparation activity, it constitutes the cornerstone of the team's offensive ability, but also can disperse the opponent's defensive power, help the team to obtain the necessary attack time and space. Offensive players usually need to make a rich, active, and fast off-ball run to get rid of their opponent's defense, thus ensuring the effectiveness of the offense. Through the observation of the video of the game, the German team players have a keen observation of the court, a clear purpose, and can seize the opportunity in a timely manner. The action when running is also varied. Usually, it can quickly take actions and get rid of the opponent's defense in a short time, and the German team players' tactical awareness is quite tacit, and they can achieve good technical and tactical purposes. Due to the in-depth study and stringing of the 4-3-3, 4-2-3-1, and other formations, the German team formed their characteristics in the sports battle. Through the observation of the players in the frontcourt, we can find that in addition to Klose, the German team has a sensitive sense of running position in the frontcourt, and has excellent personal skills, especially the footwork and physical ability are quite outstanding. The running position can be flexible and effective, and it is a difficult attacking power for the opponent.

Especially in the moment when the German team made a quick attack in the frontcourt, the front waist and the avant-garde have a firm and clear will. Once a player has obtained the ball, several offensive players will immediately assist in the running position. Improve the emphasis on football players' personal skills and team tactical training, and cultivate players' tactical awareness and ability to read the game. Encourage players to effectively complete various skills and tactics in the face of fierce and fast-paced competition. At the same time, it should improve the team's overall tactical ability in the fast offensive and defensive transition to cultivate good ground release and ball control ability and organizational penetration ability of the players, improve the accuracy of the player's releasing and the rationality of the releasing method. Train players to have the ball, the awareness and ability to run without the ball. For a team, to get the ball, running is a necessary preparation activity, it constitutes the cornerstone of the team's offensive ability, but also can disperse the opponent's defensive power, help the team to obtain the necessary attack time and space. Various tactics can be used in the game, such as ball control, defensive counterattack, personnel turnover, formation transformation, and need to strengthen the positioning ball tactics training physical fitness is one of the essential elements of football skills and tactics, but also the key to victory in the game

factor. Especially for the World Cup competition, the characteristics of the competition, such as intense, continuous, and long-term competition, it is especially important to strengthen physical training, expand the defensive range, and rationally apply various defensive techniques. Reduce the number of fouls in the backcourt, especially the fouls near the penalty area should be minimized.

In the 2014 World Cup group stage, the German team adopted three 4-3-3 formations and achieved good results. In the 2018 World Cup group stage, Germany has adopted the 4-2-3-1 formation in three games. The biggest difference between 433 and 4231 is the efficiency of counterattack and the rate of ball control. 4231 is a perfect formation for the team, derived from the 451 mainly to deal with the extremely hot diamond 442 play at that time because you can build a double defensive midfielder, allowing the midfield to be out of the way of counterattack, The frontcourt uses the front waist and the center + bilateral to form a diamond attack system. Even if it is four dozen in the counterattack, the larger space will put much pressure on the defense, but at the same time, this style is for the former. The back of the waist has a high ability to take the ball and the field of view. The release success rate and the straight-through ability are already the requirements. At the same time, the presence of the midfield barrier and the rib attack is considered to be the most balanced formation of the offensive and defensive. The ability of multi-faceted needs 4231 requires stringent requirements for the specific attributes of each position. The guards should be able to attack and defend the defensive midfielder. However, the lineup of the 2014 World Cup period no longer exists, and this group of players is no longer the state of the year. So, it is impossible to play out the effect of 4231.

In the nearly ten-year competition, the Chinese team used the 4-3-3-based formation. The advantage is that the attack power is strong, but correspondingly, the disadvantage is that the number of players in the midfield is small, only three people. There are three defenders in the midfield, which can be attacked and defended. However, this formation requires a strong guard ability. Once the central defender is absent, the 433 will face the danger of rear emptiness. Therefore, in the absence of offensive players, occasionally the 5-3-2 formation will be used to make up for the lack of defense. It is also known as the defensive counterattack. There is an unpleasant name called "Bus." This is a way for a weak team to face a strong team and have to adopt a method to increase the strength of the defense and thus look for opportunities to counterattack. However, this formation also has weaknesses, that is, it increases the back defense, and at the same

time weakens the strength of the sidewalk, so the opponent can use the breakthrough of the sidewalk to form a shot. When the German team is against opponents who use this formation, they will choose to release, especially on the right. There is only one reason why China will always choose this formation. That is, there are no successors, and no new young players can serve as key players. This must mention the difference between the two countries' youth training.

League-based, youth training is the root; this is the basic principle of football development. German football has flourished in the last ten years and is following this rule. In the World Cup in Brazil, the German team won the fourth trophy in history. From the outside world, this is the fruit of German football's ten years of recovery. In the 2000 European Cup German Group Match, the German Football Association, which was painful and painful, launched a national youth training program in 2002. In the next ten years, German youth training entered the golden period of development. The children of the 1986-1989 age group were the first beneficiaries. The German youth team that won the U21 in 2009 was also the result of the youth training during this period: Royce, Muller, Özil, Khedira, Boateng, Neuer, and Hummels, now they are the pillars of German football. Since the 90s, Germany has Gotze, Gundogan, Ter Stegen, Draxler, and Cross, and Hurley has long been famous. The growth of these two generations of youth training has helped German football to become brilliant. It is worth mentioning that the German youth training standards have higher requirements for will, strength, and physical strength than other football powers, which leads to the production of many tough guys in German football, from Larne, Beckenbauer, and Vogts to horses. Teus and Bremer are iron people who cannot run.

After the late 1990s and early 2000s, German football ushered in the spring, the 3rd place in the 2006 World Cup, the 2008 European Cup runner-up, the 2010 World Cup 3rd, and the 2012 European Cup 3rd, finally in the 2014 World Cup, the German Legion on the top of the world. The World Cup in Germany is like standing at the top of the pyramid; below the top is the cornerstone of the foundation.

Youth training is like a cornerstone, a layered promotion, a solid foundation of the youth training system, bringing a qualitative leap to German football (Nino, 2014).

This has to rely on a perfect athlete selection process, from primary school to even smaller exposure to football, showing a passion for the sport, which is crucial. According to research, German students of primary school can choose their preferred sports. Those participants having followed one of the three recommended sports afterwards show

ed better competition results (Hohmann, Fehr, Siener & Hochstein, 2017).

This kind of fairness and health is reflected in business operation and competitive development. Many clubs in the Premier League, such as Chelsea and Manchester City, belong to the private property of the individual; Real Madrid and Barcelona in La Liga are different membership clubs that do not need to consider profitability. Only the Bundesliga is different, and the "50+1 policy" ensures the pure blood of German football. The so-called "50+1 policy" means that in the German league, private investors and groups cannot hold more than 51% of the shares of the club. The club belongs to the fans, and the unrestrained investment beyond its strength no longer exists. (Hengsheng Sports, 2018).

Eliminating the emergence of "upstarts" is conducive to the sustainable development of the league. Let more young people get opportunities, not foreign aid. At this point, the Bundesliga that implements the "50+1 policy" has advantages over other leagues. In the 2014-15 season, the proportion of foreign aid in the Premier League was as high as 67%, the proportion of foreign aid in Serie A was 54%, and the proportion of foreign aid in the Bundesliga was 45%. It should be noted that in 2003 and 2004, the proportion of foreign aid in the Bundesliga was as high as 55%. More local players get the opportunity to play, will stimulate the development of youth training.

The German Football Association puts high demands on the youth training of the clubs. The Bundesliga and the German B team must be equipped with professional academies. The Bundesliga youth team must have three venues, three coaches, professional medical rooms, physical therapists, and team doctors. Once the requirements are not met, the Football Association will revoke the club qualification certificate and expel the league.

Objectively speaking, the German Football Association's strict regulations on club youth training and infrastructure made the entire Bundesliga slump in 2002-2004. However, from the current point of view, the Football Association's iron fist method is successful. The club focused on building youth training according to requirements. From 2002 to 2010, the youth training plan invested 520 million euros, and the annual investment increased from 48 million to 86 million. In 2013, the investment reached 100 million euros and more than 5,000. The -18-year-old player became the beneficiary of the youth training program. Young people are continually emerging, and now the number of players under the Bundesliga under the age of 23 accounts for 15% of the total, and

ten years ago, only 6% of players in the Bundesliga were under 23 years old. The average age of the Bundesliga has dropped from 27.09 to 25.75, and the adolescent development has made the Bundesliga more youthful.

The Bundesliga's pleasant football atmosphere makes the whole of Germany full of football. According to official FIFA data, Germany is the country with the most significant number of registered players in the world, with a total of 6.3 million. There are only 80.8 million people in Germany as a whole, that is to say, one out of every 13 Germans is a registered player. China currently has a population of 1.39 billion, but the registered football population is only 30,000. The number of people involved in football in Germany is as high as 16.31 million. One out of every five people is a stable and long-term football. There are 27,000 football clubs in Germany, ranking the third in the world. Also, there are 160,000 competition officials in Germany. Twenty-eight thousand four hundred football coaches are holding UEFA B licenses, 5,500 A license coaches and more than 1,000 professional coaches. Such a vast difference in the football population base is an essential factor that leads to such a massive power gap.

The German Football Association has been paying attention to the construction of youth training at the beginning of this century. It seems to be invaluable to the development of German football. More children are involved in football, more standardized clubs are born, more coaches and referees who know football, and German football is on the road of healthy development. The Germans used a one-year, 100 million euro to develop youth training, and the less developed Spanish people used youth training to maintain the lifeline of the club. The same goal, the result of the development of youth training, has produced outstanding football talents. The operation mode of Germany and Spain has become a climate, which is worth learning in Chinese football.

Compared with China, after the German dynasty in 1998, the German Football Association has formulated a detailed youth training revival plan for 12 years. After six years, Germany has become increasingly popular in Europe! Moreover, won the 2014 World Cup with the 2009 European Youth Championship team! On the contrary, the Chinese team, the 97 World Cup qualifiers in Golden State, also began to reflect and formulated a detailed youth training plan. Sixteen years later, the unprecedented three consecutive years of Chinese football history missed the World Cup Asian Top Ten.

At the same time, it also benefits from the protection of youth training in the entire football environment. The first fire after Platini took office was to prohibit the players under the age of 18 from making an international transfer. It officially came into effect on Jan

uary 1, 2009, and was written into Article 19 of the FIFA Player Transfer Regulations. In order to promote the protection of young players' normal mobility and youth club rights, Platini actively lobbied the co-chairman of the European Union, Sarkozy, after the European Cup in 2008. He hoped that the EU would enact special legislation to prevent abnormal youth training. In a sense, it is benefiting from Platini's escort of youth training in the past seven years, and the development of football throughout Europe has grown stronger.

Since the "professionalization" of Chinese football, most of the amateur and professional training systems have been embarrassed. Now the responsibility of youth training falls on professional clubs. Although a few clubs have achieved fruitful results in youth training, they are far from solving the problem of "depletion of talents" in Chinese football.

According to the China Youth Football League youth training survey report, 49 Super League, China A, and China B clubs have an echelon. Luneng, Greentown, Shanggong, Evergrande, and RF all have standard fourth echelon, and some even have Level 6 echelon (Wandering, 2014). According to the data, among the 49 clubs, 20% have echelons and are in their own hands.

Multiple characteristics also characterize clubs, the ownership nature of the existing echelon. Most of the Super League clubs still attach importance to self-built echelons. Of the 49 clubs, 54% of the clubs have their echelon, most of which are Super League teams, 20% of the clubs are still working with the Sports Bureau and the local Football Association, and the rest are named after the local Football Association and the local general school.

Finally, through the investigation, it was found that although the youth training of Chinese football is extensive, the rate of success is not high, and the support of the students has become a heavy burden for some families. In this respect, Germany may be worth learning. Germany has three-steps: "pivot system" provides initial training and support, and "elite football school" continues a high level. Training and "club youth training center" allows young players to connect with professional football. The parents in China hope that the family income will be higher and higher, and football will enter the schoolyard, and more people will begin to play football. Then, through the form of the sports school, the state's support and subsidies are formed.

The performance of Chinese national characters in the past few years has deteriorated.

In fact, since the Chinese Football Association proposed the development plan of "campus foot-ball" in 2014, the youth population base of football participation in the country has been significantly improved. However, participating in football now seems to be only a solution rather than a skill. The shortcomings that restrict China's youth training are the training mechanisms, coaching level, and competition system.

Since the professionalization of Chinese football, the amateur and professional training system has gradually been transferred to the club's youth training echelon. For example, Luneng and Greentown's echelon construction is quite good, but Chinese football only hopes that one or two experimental fields will be difficult to solve. For example, Dalian Albin's poor record in the Super League this season has finally been downgraded, which reflects the de-cline of Dalian, the traditional Chinese football talent base. Liaozu also fought for relegation. Liaoning football also has a poor record in these years, which is considered to be the result of the continuous loss of many outstanding players and the un-favorable training of youth training.

John Maynard Keynes (1936) once said that "exploring new ideas is more difficult than abandoning old ideas." In the Chinese youth training system, the dislocation of content, and the lack of content in the age group are the real reasons for the lag in the development of Chinese football. We must emancipate our minds, fully absorb the characteristics of five-a-side football, explore the advantages of small-field football training, change old ideas, master new content, genuinely treat the internal injuries of Chinese football, develop the advantages of small-field football training, and enhance athletes. The ability to play in a five-a-side competition is a viable option, which includes an important 4v4 confrontation system.

In Europe, many coaches who are engaged in five-a-side football are also looking for various training methods, especially in the Netherlands. The gradual relationship has created a small-field football training method, which has dramatically improved the skills and tactics of eleven-a-side football. In recent years, the revolutionary change of German football has also followed this line of thought. The World Cup and the European Cup champion Spain is the double champion of World Cup soccer and World Cup indoor football.

At present, the purpose of five-a-side football in the world should be as follows: improve the player's skills and tactics, improve the intelligence of football, and improve the skill; the more the number of touches than the eleven-footed football makes the

player faster. Accurate, its unique technique and tactics have been successfully transformed into eleven-a-side football; in line with the latest requirements of modern football, players must participate in offense and defense, more tactics, more concentrated observation, faster attack and defense conversion speed and releasing speed, faster foot skills, stronger self-confidence, faster and more correct personal and group decision making, more fun, and a revolutionary breakthrough in goalkeeper technique. It can be seen that in this gradual one-way relationship, as the coaches of all levels in the youth training system, learn and master the skills and tactics of five-a-side football and use them reasonably in training to train football that meets the needs of modern football. If such knowledge is absent and there is a lack of practical training, it is bound to be misplaced or missing in such a relationship. Such misunderstanding and lack of content are the important factors that cause Chinese football to fail to produce talents and results.

According to the FIFA classification of age groups, we can divide the 6 to 18-year-olds into four stages: the school-age children stage, 6–12 years old; the prepubescent stage 12–14 years old; the post-puberty stage 14–16; and the mature early-stage, 16–18 years old (<https://www.fifa.com/>). China's current youth football training system is based on such age groups.

First, the tactical concept in eleven-a-side football refers to individual tactics, group tactics, and overall tactics. In these three, the group tactics are crucial, that is, the necessary capabilities of 2v2, 3v3, and 4v4. Now let us look at five-a-side football. In group tactics, the coaches emphasize 2v2 and 3v3. In overall tactics, they are 4v4 and 5v4. All team tactics in the five-a-side football serve the overall tactics because the narrow factors determine the characteristics. Then in the overall tactics, it is necessary to involve the formation in the five-a-side football mentioned above. Now, including FIFA, all the formations of the five-a-side football are collectively referred to as the "initial station," which is also determined by the narrow factors of the five-a-side football field. Because, in the game, all the initial positions of the five-a-side football are constantly changing. The previous minute maybe 3-1, and the next maybe 2-2 or 2-1-1, it may be a 4-0 station or form 1-2-1 station. Based on each type of station, there are usually three or four basic offensive methods. Because of the defensive and offensive balance, there are many ways to move around in five-a-side football, with three rotations and four rotations. Therefore, in general, the five-a-side football player chooses from dozens of offensive methods based on the position of the opponent in the case of five or six initial

positions. This is what we call the decision of the football player. The higher the correct rate of decision making, and the speed basically determine the outcome of the game. It also includes training methods that can be applied to small-venue 4v4 training (see Fig. 49).



Figure 49. 4v4 training method.

The 30x20 area is divided into four rectangular areas (15x10), a 4v4 training venue. The offensive side is in black, and the defense is in yellow.

6. Objective evaluation of research methods

In the following section, some subtle flaws in the research process of the thesis will be explained, and a transparent explanation will be made to provide a basis for further improvement.

6.1 Limitations in the experiment

First of all, the selection of the camera device had an impact on the collected data, because the resolution and pixels of different models of GoPro machines are different, which makes a difference for later data acquisition and analysis. Therefore, we should consider the type and brand of the camera to be as consistent as possible.

It turns out that the camera's frame count and pixel quality are decisive in this survey. This should minimize unnecessary variable increases. In addition, the weather can-not guarantee that the game is in a sunny state when the footage is collected, so when it is cloudy or raining, some parts of the playing field are blurred, which will affect the quality of the captured video.

On the other hand, Figure 50 shows the lack of partial information caused by the distortion and distortion of the video material in each image. On the other hand, the position of the camera is limited (the red circle mark cannot mark the coordinates or the camera part that is difficult to read).

One possible improvement is to place the camera higher so that GoPro's wide-angle functionality can be used to a greater extent, and more reference coordinates can be placed. For example, it is placed in the camera tower. This kind of equipment is widespread in the German competition venue, but it cannot meet such conditions in the Chinese competition venue (see Fig. 51).

Due to internal reasons of the game, when faced with different opponents and choosing a different system lineup, there is no distinction. Sometimes it is not possible to over-emphasize research predictions and performance control variables (Mackenzie & Cushion, 2013).

For example, different game tactics: In which lineup does the team act? - Is the game established through the central defender or the midfielder? - What is the number of guards?

The opponent's formation: the tactical changes and alignment of the opposing team may need to change their style of play.

The individual characteristics of the athletes (individual tactics): - When the striker is against the central defender, is he choosing continuous confrontation, or moving?



Figure 50. Schematic diagram of missing coordinates of the stadium.



Figure 51. 3v3 scene on the field (Auerochs, Barthel, Delf, Frei, Reinhard, Weickmann & Winkler, 2017).

6.2 Limitation of research methods

The specific limitations mentioned in the explanation below mainly relate to the analysis program MATLAB we used. The current flaw in this software is that the calibration is inaccurate. The position and axis of the athletes on the field are relatively close, but they cannot be 100% accurate.

Figure 52 clearly shows the deviation of the calibration coordinates from the calculated position to the measured position. As can be seen from the figure, basically, each point can be satisfied at the desired position, but even if there is a slight deficiency, an error within 1–3 meters appear in the actual game; however, this method must be used at present.

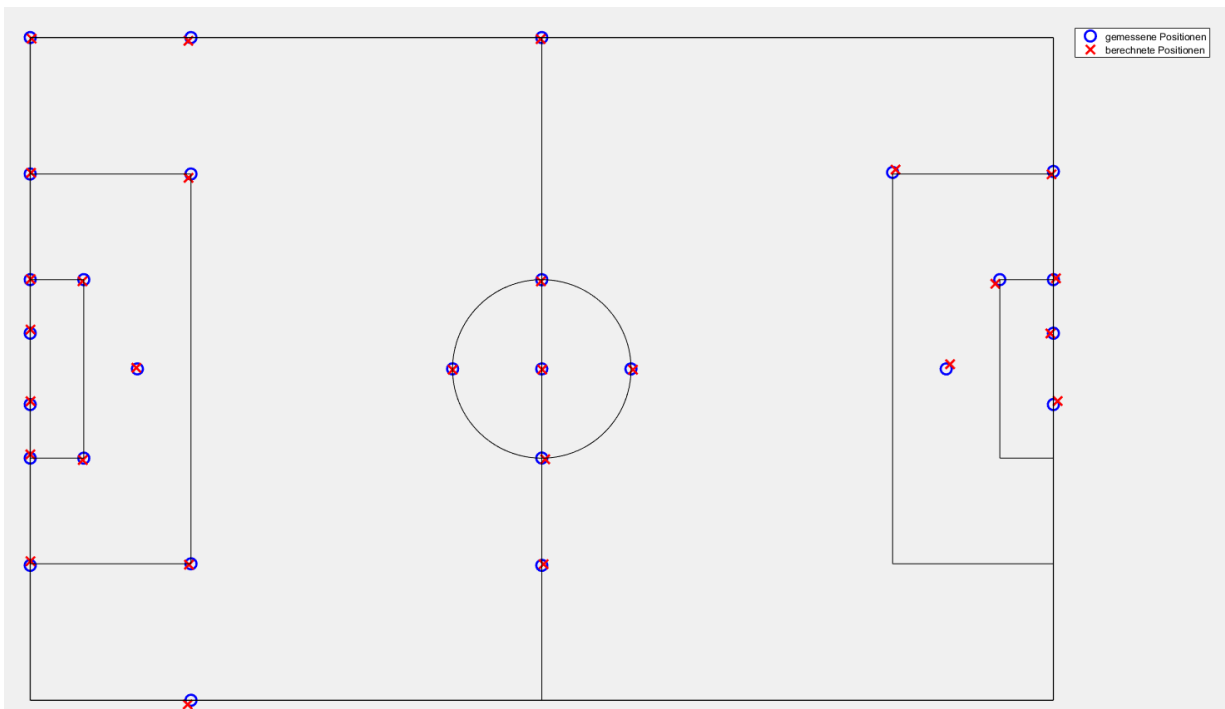


Figure 52. The deviation of the calibration coordinates from the calculated position to the measured position.

Objectivity, reliability, and effectiveness

The principle of objectivity means that the measurement results should be independent of the surveyor.

No objectivity aspects were given in this study. Therefore, the following conditions in data collection based on subjective assessment depend on the measurer.

- Use the cursor to accurately mark the player: the minimum deviation corresponds to 1–2 meters.
- The number of players that are not always clearly identifiable: estimated based on the game situation.
- Player-to-ball distance: Deception due to player distortion and mismarking (see Figure 53).

Figure 53 depicts a game situation in which players who appear to be 19 meters from the ball are closer to the ball player than players who are only 16 meters away.

The reliability of the measurement means that the data should be outlined or accumulated in this way that the same characteristics are produced with possible repeated measurements of the same features.

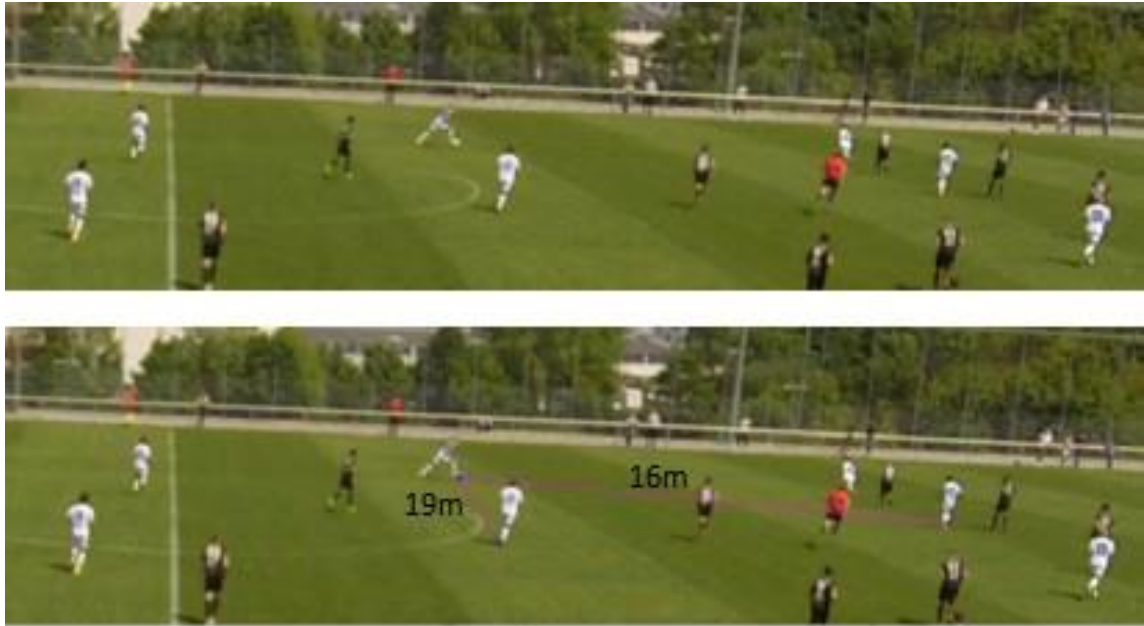


Figure 53. A situation that occurs in match monitoring (Auerochs, Barthel, Delf, Frei, Reinhard, Weickmann & Winkler, 2017).

In this study, a clear definition as a parameter was challenging to express.

The players do not have to use the foot as the only means to touch the ball—the first touch of the ball can be by using the head or other body parts. At the time of acquisition, when the coordinate points are placed to measure the data, some deviation occurs.

6.3 Final evaluation

With the development of computer technology and related disciplines, some new ideas, theories, techniques and methods have been introduced into the field of technical and tactical research of confrontation projects, such as database, multimedia, intelligent analysis, decision support, and expert systems (Zhang, 2009).

The results derived from the amount of data collected from the game can be discussed at a deeper level. Match analysis is the objective recording and examination of behavioral events that occur during the competition (Carling, Williams, & Reilly, 2006). The most important is to apply the conclusions to future 4v4 ball football training and to achieve proper training control and training design results.

The data of China and Germany have concluded, and they have apparent trends. We need to be more flexible in future research, such as how to make a reasonable arrangement with less playing or more.

Nevertheless, as of now, the analysis of the collected games has provided us with useful clues, so that future training forms can be referenced as much as possible and organized in a more realistic environment

7. Conclusions and prospects

After years of technical changes in football and tactical innovations, we must be able to analyze the pressure levels generated during the game from different locations. However, there is currently no indicator definition to regulate, what is the best solution for the correct region, such as the final answer to the pressure in the 4v4 case in this article. However, we have also proved a huge demand for this research in the future.

For example, the information we obtained in the DFB literature

(21 × or 21 m 17 x 17 m instead of 30 x 30 m or 25 x 25 m).

However, it must also be noted that although this article does not divide the course further, it is obvious that the pressure levels in different areas of the course are quite different.

For future research, it may be mainly related to the pressure situation in the competition. To be more detailed and specific, each athlete should be set as a separate individual, and their position definition should be compiled. There may be higher requirements in the collection of MATLAB data.

However, overall, data collection will undoubtedly be further improved. In the face of some substantial defects, it is still necessary to find the best way to solve and make full use of computer self-learning ability to identify and calculate. This is a trend for the future.

Reference

- Almeida, C. H., Ferreira, A. P., & Volossovitch, A. (2013). Offensive sequences in youth soccer: effects of experience and small-sided games. *Journal of human kinetics*, 36(1), 97-106.
- Auerochs, L., Barthel, S., Delf, F., Frei, Y., Reinhard, M., Weickmann, D & Winkler, T (2017). *Spielanalyse zur Drucksituation am Ballbesitzer im Fußball* (Unpublished paper). University of Bayreuth, Bayreuth, Germany
- Bai, X. F. (2014). *Research on key issues in soccer video analysis*. Doctoral dissertation, Harbin Institute of Technology.
- Ban, Z. (2016, August 22). 4v4 offensive analysis: teach you how to apply 4v4 flexibly to the training class. Retrieved from <http://www.dongqiudi.com/archive/212221.html?page=>
- Bush, M., Barnes, C., Archer, D. T., Hogg, B., & Bradley, P. S. (2015). Evolution of match performance parameters for various playing positions in the English Premier League. *Human movement science*, 39, 1-11.
- Cao, X., LI, X., FU, Y., WU, H., LIU, T., & LIANG, Y. (2019). Research on the Influence of Home and away in China Super League on Team Performance Based on Complex Network Method. *Sport Science Research*, 40(4).
- Carling, C., Williams, A. M., & Reilly, T. (2006). Handbook of soccer match analysis: a systematic approach to improving performance. *Journal of sports science & medicine*, 5(1), 171.
- Clemente, F. M., Couceiro, M. S., & Martins, F. M. (2012). Towards a new method to analyze the soccer teams tactical behaviour: Measuring the effective area of play. *Indian Journal of Science and Technology*, 5(12).
- Cooper, P. (2006). Why the 4v4 format is the answer for youth football. *Soccer Coaching International*, 17, 22-25.
- Coerver, W. (1985). *Pembinaan Sepakbola Ideal*. Jakarta: PT. Gramedia.
- Dellal, A., Owen, A., Wong, D. P., Krusturp, P., van Exsel, M., & Mallo, J. (2012). Technical and physical demands of small v. large sided games in relation to playing position in elite soccer. *Human movement science*, 31(4), 957-969.
- Dellal, A., Lago-Penas, C., Wong, D. P., & Chamari, K. (2011). Effect of the number of ball contacts within bouts of 4 v. 4 small-sided soccer games. *International Journal of Sports Physiology and Performance*, 6(3), 322-333.
- Duarte, R., Araújo, D., Freire, L., Folgado, H., Fernandes, O., & Davids, K. (2012). Intra-and inter-group coordination patterns reveal collective behaviors of football players near the scoring zone. *Human Movement Science*, 31(6), 1639-1651.
- FIFA, (2019, February 6). Retrieved from <https://www.fifa.com>
- Galileo. (2019, March 27). Retrieved from <https://baike.baidu.com/item/%E5%8A%A0%E9%87%8C%C2%B7%E8%8E%B1%E5%9B%A0%E5%85%8B%E5%B0%94/5210548?fromtitle=%E8%8E%B1%E8%8C%B5%E5%85%8B%E5%B0%94&fromid=2284221&fr=aladdin>
- Garcia, J. D. C., Román, I. R., Calleja-González, J., & Dellal, A. (2015). Comparison of tactical offensive variables in different playing surfaces in sided games in soccer. *International Journal of Performance Analysis in Sport*, 15(1), 297-314.
- Guan, Y. (2010). Analysis of the Attack Characteristics of the German Team in the 2010 FIFA World Cup Finals. *Journal of Harbin Institute of Physical Education*, 28(6).
- Hammann, P. & Erichson, B. (2006). Market research. UBT, Stuttgart. *54 Tables (Fundamentals of Economics: Business Administration, 805)* (4th, revised and later editions).
- Hengsheng Sports, (2018, March 20). *Knowledge point! What does the Bundesliga 50+1 policy mean? The Bundesliga is here*. Retrieved from http://www.sohu.com/a/225961518_544832
- Hodgson, C., Akenhead, R., & Thomas, K. (2014). Time-motion analysis of acceleration demands of 4v4 small-sided soccer games played on different pitch sizes. *Human movement science*, 33, 25-32.
- Hohmann, A., Fehr, U., Siener, M., & Hochstein, S. (2017). Validity of early talent screening and talent orientation. *Sport science in a metropolitan area*, 590.
- Hohmann, A., Renye, H. E., & Siener, M. (2019). Genius Screening and Sports Orientation: The Influence of German Second-grade Children's Sports Performance Ability on the Early Success of Young Football Players. *Sport Science Research*, 40(4).

- Hughes, C. (1980). Analysis and research on the best area of shooting in football matches. *Tactics and Skills*, Dragon source, *National Library of China*.
- Hughes, M., & Franks, I. (2005). Analysis of passing sequences, shots and goals in soccer. *Journal of sports sciences*, 23(5), 509-514.
- Jastrzębski, Z., & Radzimiński, Ł. (2015). Individual v general time-motion analysis and physiological response in 4 v 4 and 5 v 5 small-sided soccer games. *International Journal of Performance Analysis in Sport*, 15(1), 397-410.
- Jones, S., & Drust, B. (2008). Physiological and technical demands of 4 v 4 and 8 v 8 games in elite youth soccer players. *Kinesiology: International journal of fundamental and applied kinesiology*, 39(2), 150-156.
- Keynes, J. M. (1937). The general theory of employment. *The quarterly journal of economics*, 51(2), 209-223.
- Lefèvre, S., Gérard, J. P., Piron, A., & Vincent, N. (2002, September). An extended snake model for real-time multiple object tracking. In *Proc. ACIV* (pp. 268-275).
- Li, B.J. (2010). A troublesome fatherland: On the German identity crisis of the German nation. *Journal of Tsinghua University* (Philosophy and Social Sciences. No. 2 2010(Vol. 25).
- Li, K. F., Ning, Y.X., & Liu, C. (2017). Research on the influence of 4v4 football training mode on the endurance level of pupils. *Sports*, (18), 71-72.
- Little, T., & Williams, A. G. (2007). Measures of exercise intensity during soccer training drills with professional soccer players. *The Journal of Strength & Conditioning Research*, 21(2), 367-371.
- Liu, T., Fournier-Viger, P., & Hohmann, A. (2018). Using diagnostic analysis to discover offensive patterns in a football game. In *Recent Developments in Data Science and Business Analytics* (pp. 381-386). Springer, Cham.
- Liu, T., Hohmann, A., Castro, C., & Sörgel, V. (2014). Systematische Spielanalyse im Frauenfußball-Finale des Algarve Cups 2012 Deutschland-Japan. *Zeitschrift für Angewandte Trainingswissenschaft*, 21(2), 172-193.
- Loy, R. (1995). Systematic game observation in football. *Competitive sports*, 25 (3).
- Loy, R. (2006). Tactics and analysis in football. *Sports science and sports practice*, 145. [S.l.: s.n.].
- Mackenzie, R., & Cushion, C. (2013). Performance analysis in football: A critical review and implications for future research. *Journal of sports sciences*, 31(6), 639-676.
- Michels, R. (2004). *Teamcoaching: Der Weg zum Erfolg durch Teambuilding*. onLi-Verlag, bfp-Verlag Lindemann.
- Nino, (2014, November 2) *Desi's Road: Aspirational Ideal Country*. Retrieved from <http://sports.163.com/special/anglezero/germany-spaintraining.html>
- Pfeiffer, M., & Hohmann, A. (2012). Applications of neural networks in training science. *Human movement science*, 31(2), 344-359.
- Rein, R., & Memmert, D. (2016). Big data and tactical analysis in elite soccer: future challenges and opportunities for sports science. *SpringerPlus*, 5(1), 1410.
- Sannicandro, I., & Cofano, G. (2017). Small-sided games: Analysis of the internal load and technical skills in young soccer players. *International Journal of Science and Research*, 6(3), 735-739.
- Silva, P., Aguiar, P., Duarte, R., Davids, K., Araújo, D., & Garganta, J. (2014). Effects of pitch size and skill level on tactical behaviours of Association Football players during small-sided and conditioned games. *International Journal of Sports Science & Coaching*, 9(5), 993-1006.
- Soho, (2019, March 05). Retrieved from <https://m.sohu.com/c/21756/>
- Tian, M.J., (2000). *Sports training*. People's Sports Publishing House.
- Tiedemann, T., Francksen, T., & Latacz-Lohmann, U. (2011). Assessing the performance of German Bundesliga football players: a non-parametric metafrontier approach. *Central European Journal of Operations Research*, 19(4), 571-587.
- Taki, T., Hasegawa, J. I., & Fukumura, T. (1996, September). Development of motion analysis system for quantitative evaluation of teamwork in soccer games. In *Proceedings of 3rd IEEE international conference on image processing* (Vol. 3, pp. 815-818). IEEE.
- Tang, F, Chen X.K, Liu, H, & Xu, X.J. (2001). 2000 Analysis of the main defensive techniques and tactics in the European Football Championship. *Journal of Beijing Sport University*, 24(2), 264-266.
- Watanabe, T., Haseyama, M., & Kitajima, H. (2004, October). A soccer field tracking method with

- wire frame model from TV images. In *2004 International Conference on Image Processing, 2004. ICIP'04.* (Vol. 3, pp. 1633-1636). IEEE.
- Wang, X. (2009). *Research on the influence of the control of related elements of football 4v4 multiple confrontation exercises on endurance training load.* Soochow University.
- Wandering, (2014, November 1). *Youth training, "injury" of Chinese football*, from <http://sports.163.com/special/anglezero/zhgqingxun.html>
- Wei, Z. (2017, August). Research on the teaching system of table tennis based on artificial intelligence. In *2017 Sixth International Conference on Future Generation Communication Technologies (FGCT)* (pp. 1-4). IEEE.
- Weineck, J. (2004). *Optimales training: Leistungsphysiologische trainingslehre unter besonderer berücksichtigung des kinder-und jugendtrainings.* Spitta Verlag GmbH & Co. KG.
- Zhang, H. (2009). Diagnosis and Analysis of Computer Aided Techniques and Tactics and Its Application in Beijing Olympic Games—Taking Table Tennis Project as an Example. *China Sports Coaches*, (4), 21-22.
- Zhang, H, Liu, W, & Hu, J. (2015). Research on technical benefits of confrontational projects. *China Sport Science*, 35(9), 44-49.
- Zhang, J., & Jin, D.Y. (2014). "4v4 Training Method" - the youth training magic of Manchester United Football School. *China School Physical Education*, (007), 59-60.
- Zhang, J. (2012, January 28). Talking about football in Brazil, Germany, Italy and Argentina. Retrieved from <http://bbs.tianya.cn/post-fans-301859-1.shtml>
- Zheng, C.S., (2012). 50 small-sided games that teach the vital skills of the game. *Beijing Sport University*.

Appendix

Appendix 1: Definition of each variable

Part1-8: The 80-minute match time is divided into eight equal shares, each representing ten minutes.
A_tot_4v4: Total area formed by four offensive players and four defenders
A_own_4v4: The area formed by four offensive players
A_opp_4v4: The area formed by four defenders
Distance: Distance from a defender who is closest to the offensive player
game_ID: Representing Germany and China respectively
Score difference: The relationship between the home team and the away team
Passaction: Refers to the movements that occur in football, divided into release and receive
Passsuccess: Representing a successful release or not

Appendix 2

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.072	.005	.005	273.870

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1781869.256	1	1781869.256	23.757	.000
Residual	337595759.223	4501	75004.612		
Total	339377628.480	4502			

The independent variable is Min.

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.061	.004	.003	194.859

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	637868.867	1	637868.867	16.799	.000
Residual	170902323.212	4501	37969.856		
Total	171540192.079	4502			

The independent variable is Min.

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.022	.000	.000	169.756

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	60897.857	1	60897.857	2.113	.146
Residual	129705397.180	4501	28817.018		
Total	129766295.037	4502			

The independent variable is Min.

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.039	.002	.001	213.581

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	314087.557	1	314087.557	6.885	.009
Residual	205321592.660	4501	45616.884		
Total	205635680.218	4502			

The independent variable is Min.

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.035	.001	.001	118.185

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	76973.066	1	76973.066	5.511	.019
Residual	62868734.522	4501	13967.726		
Total	62945707.588	4502			

The independent variable is Min.

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.001	.000	.000	124.454

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	19.214	1	19.214	.001	.972
Residual	69715475.732	4501	15488.886		
Total	69715494.946	4502			

The independent variable is Min.

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.034	.001	.001	3.979

The independent variable is Min.

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	81.801	1	81.801	5.165	.023
Residual	71279.708	4501	15.836		
Total	71361.509	4502			

The independent variable is Min.

Appendix 3

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	885	457.2065	250.68287	8.42661		0.6230	0.00
Tie	1164	463.1964	256.91077	7.53019	0.6230		0.00
Lead	2454	518.6358	287.87557	5.81122	0.00	0.00	
Total	4503	492.2320	274.56101	4.09155			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	885	276.9758	177.02508	5.95063		0.7630	0.00
Tie	1164	279.5933	185.05144	5.42395	0.7630		0.00
Lead	2454	317.2576	204.24326	4.12297	0.00	0.00	
Total	4503	299.6048	195.20017	2.90890			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	885	231.3580	158.44851	5.32619		0.8870	0.00
Tie	1164	232.4279	161.38225	4.73020	0.8870		0.00
Lead	2454	255.6990	176.77372	3.56846	0.00	0.00	
Total	4503	244.8997	169.77675	2.53004			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	885	287.9485	189.47611	6.36917		0.4220	0.00
Tie	1164	295.5730	202.23201	5.92753	0.4220		0.00
Lead	2454	328.1121	225.62316	4.55456	0.00	0.00	
Total	4503	311.8073	213.72065	3.18490			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	885	137.0552	105.01185	3.52993		0.8370	0.00
Tie	1164	138.1342	110.94998	3.25200	0.8370		0.00
Lead	2454	159.1799	125.05796	2.52449	0.00	0.00	
Total	4503	149.3914	118.24433	1.76210			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	885	135.8594	118.76402	3.99221		0.654	0.005
Tie	1164	138.3432	118.43580	3.47141	0.654		0.011
Lead	2454	149.6252	128.90422	2.60214	0.005	0.011	
Total	4503	144.0034	124.44055	1.85443			

	N	Mean	Std. Deviation	Std. Error	sig.		
					Behind	Tie	Lead
Behind	885	4.8858	3.72420	.12519		0.178	0.001
Tie	1164	5.1250	3.98964	.11694	0.178		0.069
Lead	2454	5.3821	4.05904	.08194	0.001	0.069	
Total	4503	5.2181	3.98134	.05933			

	N	Mean	Std. Deviation	Std. Error	sig.		
					Behind	Tie	Lead
Behind	125	468.4865	273.93498	24.50149		0.515	0.017
Tie	965	485.9312	261.27036	8.41059	0.515		0.000
Lead	2135	530.7521	291.46692	6.30798	0.017	0.000	
Total	3225	514.9271	282.89479	4.98150			

	N	Mean	Std. Deviation	Std. Error	sig.		
					Behind	Tie	Lead
Behind	125	294.6792	180.80630	16.17181		0.871	0.066
Tie	965	297.7850	189.83716	6.11107	0.871		0.000
Lead	2135	328.7746	207.75355	4.49624	0.066	0.000	
Total	3225	318.1802	202.04541	3.55782			

	N	Mean	Std. Deviation	Std. Error	sig.		
					Behind	Tie	Lead
Behind	125	248.7745	173.33170	15.50326		0.915	0.332
Tie	965	246.9820	165.46000	5.32635	0.915		0.010
Lead	2135	264.4724	180.29227	3.90192	0.332	0.010	
Total	3225	258.6304	175.85236	3.09659			

	N	Mean	Std. Deviation	Std. Error	sig.		
					Behind	Tie	Lead
Behind	125	285.1943	188.16432	16.82993		0.212	0.012
Tie	965	311.4196	208.36449	6.70749	0.212		0.003
Lead	2135	336.5817	228.05328	4.93557	0.012	0.003	
Total	3225	327.0608	221.29044	3.89671			

	N	Mean	Std. Deviation	Std. Error	sig.		
					Behind	Tie	Lead
Behind	125	137.5722	104.80070	9.37366		0.413	0.015
Tie	965	147.1675	114.91406	3.69921	0.413		0.000
Lead	2135	165.1260	127.83434	2.76661	0.015	0.000	
Total	3225	158.6844	123.58013	2.17612			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	125	141.6408	111.52790	9.97536		0.616	0.228
Tie	965	147.7725	122.45639	3.94201	0.616		0.102
Lead	2135	155.9311	132.34534	2.86424	0.228	0.102	
Total	3225	152.9360	128.74243	2.26703			

	N	Mean	Std. Devia- tion	Std. Error	sig.		
					Behind	Tie	Lead
Behind	760	455.3512	246.79424	8.95217		0.000	0.268
Tie	199	352.9502	201.50229	14.28412	0.000		0.000
Lead	319	437.5442	248.17015	13.89486	0.268	0.000	
Total	1278	434.9614	243.16787	6.80206			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	760	274.0641	176.34629	6.39675		0.000	0.002
Tie	199	191.3774	127.46673	9.03588	0.000		0.001
Lead	319	240.1767	159.03029	8.90399	0.002	0.001	
Total	1278	252.7302	167.92089	4.69720			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	760	228.4934	155.80150	5.65151		0.000	0.001
Tie	199	161.8512	116.82581	8.28156	0.000		0.008
Lead	319	196.9805	137.62533	7.70554	0.001	0.008	
Total	1278	210.2505	147.87669	4.13651			

	N	Mean	Std. Devia- tion	Std. Error	sig.		
					Behind	Tie	Lead
Behind	760	288.4015	189.81036	6.88515		0.000	0.173
Tie	199	218.7291	147.26320	10.43921	0.000		0.002
Lead	319	271.4265	199.90615	11.19260	0.173	0.002	
Total	1278	273.3155	187.95831	5.25770			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	760	136.9701	105.11519	3.81293		0.000	0.008
Tie	199	94.3291	75.40982	5.34566	0.000		0.005
Lead	319	119.3839	95.66001	5.35593	0.008	0.005	
Total	1278	125.9407	99.83264	2.79259			

	N	Mean	Std. Devia- tion	Std. Er- ror	sig.		
					Behind	Tie	Lead
Behind	760	134.9086	119.95546	4.35124		0.000	0.000
Tie	199	92.6182	82.75116	5.86607	0.000		0.131
Lead	319	107.4213	92.63878	5.18678	0.000	0.131	
Total	1278	121.4624	109.71689	3.06908			

Appendix 4

Group Statistics

	pass action	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	release	2308	472.1283	260.67725	5.42607
	receive	2195	513.3706	286.98389	6.12548
A_own_4v4	release	2308	284.7853	183.64180	3.82255
	receive	2195	315.1872	205.55011	4.38733
A_opp_4v4	release	2308	223.0649	155.88583	3.24481
	receive	2195	267.8584	180.45818	3.85176
A_tot_3v3	release	2308	298.5240	203.42456	4.23434
	receive	2195	325.7745	223.23245	4.76475
A_own_3v3	release	2308	140.1748	111.61942	2.32339
	receive	2195	159.0824	124.12105	2.64928
A_opp_3v3	release	2308	131.3295	112.88346	2.34970
	receive	2195	157.3298	134.27546	2.86602
Distance	release	2308	4.3783	3.43181	.07143
	receive	2195	6.1011	4.31509	.09210

		Levene's Test for Equality of Vari- ances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances as- sumed	15.817	.000	-5.052	4501	.000
	Equal variances not assumed			-5.040	4407.307	.000
A_own_4v4	Equal variances as- sumed	24.239	.000	-5.239	4501	.000
	Equal variances not assumed			-5.225	4385.767	.000
A_opp_4v4	Equal variances as- sumed	34.339	.000	-8.927	4501	.000
	Equal variances not assumed			-8.894	4336.151	.000
A_tot_3v3	Equal variances as- sumed	12.833	.000	-4.285	4501	.000
	Equal variances not assumed			-4.275	4411.268	.000

A_own_3v3	Equal variances assumed	20.779	.000	-5.380	4501	.000
	Equal variances not assumed			-5.366	4394.510	.000
A_opp_3v3	Equal variances assumed	41.324	.000	-7.046	4501	.000
	Equal variances not assumed			-7.016	4290.969	.000
Distance	Equal variances assumed	129.452	.000	-14.864	4501	.000
	Equal variances not assumed			-14.780	4186.704	.000

Group Statistics

	pass action	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	release	579	429.0168	229.27681	9.52842
	receive	699	439.8854	254.15787	9.61313
A_own_4v4	release	579	244.2693	156.27918	6.49474
	receive	699	259.7386	176.78979	6.68680
A_opp_4v4	release	579	191.3361	135.72388	5.64049
	receive	699	225.9179	155.59653	5.88520
A_tot_3v3	release	579	262.6652	170.61096	7.09035
	receive	699	282.1375	200.89241	7.59845
A_own_3v3	release	579	117.1569	86.78041	3.60647
	receive	699	133.2165	108.99904	4.12272
A_opp_3v3	release	579	107.8776	99.67458	4.14233
	receive	699	132.7150	116.26015	4.39736
Distance	release	579	3.9634	3.12133	.12972
	receive	699	5.0802	3.79091	.14339

Levene's Test for Equality of Variances

		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances assumed	5.753	.017	-.795	1276	.427
	Equal variances not assumed			-.803	4	.422
A_own_4v4	Equal variances assumed	12.095	.001	-1.640	1276	.101

	Equal variances not assumed			-1.659	1270.59	.097
A_opp_4v4	Equal variances assumed	10.941	.001	-4.188	1276	.000
	Equal variances not assumed			-4.242	1272.58	.000
A_tot_3v3	Equal variances assumed	9.548	.002	-1.845	1276	.065
	Equal variances not assumed			-1.874	1275.19	.061
A_own_3v3	Equal variances assumed	16.875	.000	-2.871	1276	.004
	Equal variances not assumed			-2.932	1274.05	.003
A_opp_3v3	Equal variances assumed	16.241	.000	-4.053	1276	.000
	Equal variances not assumed			-4.111	1274.48	.000
Distance	Equal variances assumed	20.240	.000	-5.673	1276	.000
	Equal variances not assumed			-5.776	1275.95	.000

Group Statistics

	pass action	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	release	1729	486.5653	268.89907	6.46684
	receive	1496	547.7063	294.96419	7.62612
A_own_4v4	release	1729	298.3532	190.05458	4.57068
	receive	1496	341.0953	212.84717	5.50303
A_opp_4v4	release	1729	233.6902	160.71958	3.86519
	receive	1496	287.4550	187.83242	4.85629
A_tot_3v3	release	1729	310.5322	211.98048	5.09798
	receive	1496	346.1638	230.18145	5.95120
A_own_3v3	release	1729	147.8830	117.80287	2.83308
	receive	1496	171.1682	128.85363	3.33143
A_opp_3v3	release	1729	139.1830	115.94475	2.78839
	receive	1496	168.8309	140.47634	3.63193
Distance	release	1729	4.5173	3.51961	.08464
	receive	1496	6.5781	4.46108	.11534

Levene's Test for Equality of Variances

t-test for Equality of Means

F	Sig.	t	df	Sig. (2-tailed)
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A_tot_4v4	Equal variances	8.873	.003	-6.156	3223	.000
	assumed					
	Equal variances			-6.115	3052.518	.000
	not assumed					
A_own_4v4	Equal variances	13.765	.000	-6.024	3223	.000
	assumed					
	Equal variances			-5.975	3024.045	.000
	not assumed					
A_opp_4v4	Equal variances	25.449	.000	-8.760	3223	.000
	assumed					
	Equal variances			-8.662	2961.018	.000
	not assumed					
A_tot_3v3	Equal variances	6.703	.010	-4.574	3223	.000
	assumed					
	Equal variances			-4.547	3065.841	.000
	not assumed					
A_own_3v3	Equal variances	10.840	.001	-5.359	3223	.000
	assumed					
	Equal variances			-5.325	3056.307	.000
	not assumed					
A_opp_3v3	Equal variances	33.040	.000	-6.564	3223	.000
	assumed					
	Equal variances			-6.475	2903.933	.000
	not assumed					
Distance	Equal variances	105.979	.000	-14.649	3223	.000
	assumed					
	Equal variances			-14.405	2829.032	.000
	not assumed					

Appendix 5:

Group Statistics

	position	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	offensive zone	1159	500.0399	316.60149	9.29975
	midfield zone	3344	489.5258	258.39689	4.46842
A_own_4v4	offensive zone	1159	314.2568	222.65417	6.54017
	midfield zone	3344	294.5266	184.50071	3.19055
A_opp_4v4	offensive zone	1159	234.7096	190.58210	5.59810
	midfield zone	3344	248.4314	161.82468	2.79841
A_tot_3v3	offensive zone	1159	306.7326	229.39163	6.73808
	midfield zone	3344	313.5662	208.02112	3.59728
A_own_3v3	offensive zone	1159	155.1334	130.82259	3.84274
	midfield zone	3344	147.4013	113.51349	1.96297
A_opp_3v3	offensive zone	1159	134.3327	132.04957	3.87878
	midfield zone	3344	147.3552	121.53346	2.10166
Distance	offensive zone	1159	4.4837	3.48424	.10235
	midfield zone	3344	5.4726	4.10969	.07107

		Levene's Test for Equality of Vari- ances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances as- sumed	58.178	.000	1.123	4501	.261
	Equal variances not assumed			1.019	1722.610	.308
A_own_4v4	Equal variances as- sumed	41.741	.000	2.968	4501	.003
	Equal variances not assumed			2.711	1740.613	.007

A_opp_4v4	Equal variances as-26.943	.000	-2.372	4501	.018
	sumed				
	Equal variances not		-2.192	1770.745	.028
	assumed				
A_tot_3v3	Equal variances as-21.652	.000	-.938	4501	.348
	sumed				
	Equal variances not		-.895	1859.845	.371
	assumed				
A_own_3v3	Equal variances as-28.238	.000	1.919	4501	.055
	sumed				
	Equal variances not		1.792	1798.769	.073
	assumed				
A_opp_3v3	Equal variances as-2.017	.156	-3.073	4501	.002
	sumed				
	Equal variances not		-2.952	1881.578	.003
	assumed				
Distance	Equal variances as-39.353	.000	-7.329	4501	.000
	sumed				
	Equal variances not		-7.936	2354.376	.000
	assumed				

Group Statistics

	position	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	offensive zone	947	521.0540	325.99285	10.59334
	midfield zone	2278	512.3801	262.94503	5.50919
A_own_4v4	offensive zone	947	330.5407	230.00267	7.47408
	midfield zone	2278	313.0418	189.02920	3.96052
A_opp_4v4	offensive zone	947	249.1052	197.39007	6.41432
	midfield zone	2278	262.5902	165.96513	3.47728
A_tot_3v3	offensive zone	947	319.7380	236.09339	7.67200
	midfield zone	2278	330.1051	214.81730	4.50083
A_own_3v3	offensive zone	947	163.9034	134.85529	4.38221
	midfield zone	2278	156.5148	118.54161	2.48367

A_opp_3v3	offensive zone	947	143.0608	137.33494	4.46279
	midfield zone	2278	157.0412	124.79833	2.61476
Distance	offensive zone	947	4.6817	3.62765	.11788
	midfield zone	2278	5.8023	4.25759	.08920

		Levene's Test for Equality of Vari- ances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances as- sumed	47.551	.000	.793	3223	.428
	Equal variances not assumed			.726	1481.88 3	.468
A_own_4v4	Equal variances as- sumed	35.745	.000	2.241	3223	.025
	Equal variances not assumed			2.069	1502.62 9	.039
A_opp_4v4	Equal variances as- sumed	23.779	.000	-1.984	3223	.047
	Equal variances not assumed			-1.848	1528.87 8	.065
A_tot_3v3	Equal variances as- sumed	18.783	.000	-1.212	3223	.226
	Equal variances not assumed			-1.166	1629.04 7	.244
A_own_3v3	Equal variances as- sumed	19.082	.000	1.547	3223	.122
	Equal variances not assumed			1.467	1583.47 7	.143
A_opp_3v3	Equal variances as- sumed	2.052	.152	-2.812	3223	.005

	Equal variances not assumed			-2.703	1627.29	.007
Distance	Equal variances assumed	as-31.803	.000	-7.098	3223	.000
	Equal variances not assumed			-7.580	2059.09	.000

Group Statistics

	position	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	offensive zone	212	406.1705	250.63870	17.21394
	midfield zone	1066	440.6871	241.36573	7.39260
A_own_4v4	offensive zone	212	241.5170	168.49388	11.57221
	midfield zone	1066	254.9602	167.79662	5.13931
A_opp_4v4	offensive zone	212	170.4051	139.88162	9.60711
	midfield zone	1066	218.1748	148.20582	4.53928
A_tot_3v3	offensive zone	212	248.6374	186.36904	12.79988
	midfield zone	1066	278.2234	187.97347	5.75729
A_own_3v3	offensive zone	212	115.9584	102.49383	7.03930
	midfield zone	1066	127.9259	99.22429	3.03906
A_opp_3v3	offensive zone	212	95.3442	96.26553	6.61154
	midfield zone	1066	126.6566	111.51345	3.41546
Distance	offensive zone	212	3.5992	2.58124	.17728
	midfield zone	1066	4.7681	3.67836	.11266

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances assumed	.874	.350	-1.889	1276	.059

	Equal variances not assumed			-1.842	294.025	.066
A_own_4v4	Equal variances assumed	-.303	.582	-1.065	1276	.287
	Equal variances not assumed			-1.062	300.127	.289
A_opp_4v4	Equal variances assumed	-.563	.453	-4.325	1276	.000
	Equal variances not assumed			-4.496	312.640	.000
A_tot_3v3	Equal variances assumed	-.014	.907	-2.096	1276	.036
	Equal variances not assumed			-2.108	302.559	.036
A_own_3v3	Equal variances assumed	-.404	.525	-1.595	1276	.111
	Equal variances not assumed			-1.561	294.956	.120
A_opp_3v3	Equal variances assumed	-3.253	.072	-3.815	1276	.000
	Equal variances not assumed			-4.208	333.932	.000
Distance	Equal variances assumed	-20.092	.000	-4.415	1276	.000
	Equal variances not assumed			-5.565	402.826	.000

Appendix 6:

Group Statistics

	pass success	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	Success	3920	499.6419	278.95730	4.45548
	Failure	583	442.4087	237.21486	9.82444
A_own_4v4	Success	3920	304.7919	196.89980	3.14487
	Failure	583	264.7274	179.67012	7.44118
A_opp_4v4	Success	3920	251.0308	172.45982	2.75451
	Failure	583	203.6746	143.99615	5.96371
A_tot_3v3	Success	3920	318.5107	216.35347	3.45558
	Failure	583	266.7351	189.18976	7.83544
A_own_3v3	Success	3920	152.3694	118.77343	1.89704
	Failure	583	129.3679	112.69398	4.66731
A_opp_3v3	Success	3920	149.2536	127.48893	2.03624
	Failure	583	108.7018	94.37550	3.90863
Distance	Success	3920	5.4396	4.08827	.06530
	Failure	583	3.7289	2.74151	.11354

Levene's Test

for Equality of

Variances

t-test for Equality of Means

		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances assumed	13.2	.000	4.707	4501	.000
	Equal variances not assumed			5.305	840.739	.000
A_own_4v4	Equal variances assumed	6.05	.014	4.634	4501	.000
	Equal variances not assumed			4.959	804.665	.000

A_opp_4v4	Equal variances assumed	22.2	.000	6.311	4501	.000
	Equal variances not assumed			7.209	851.054	.000
A_tot_3v3	Equal variances assumed	8.73	.003	5.475	4501	.000
	Equal variances not assumed			6.046	825.773	.000
A_own_3v3	Equal variances assumed	5.12	.024	4.391	4501	.000
	Equal variances not assumed			4.566	786.991	.000
A_opp_3v3	Equal variances assumed	46.0	.000	7.385	4501	.000
	Equal variances not assumed			9.201	930.598	.000
Distance	Equal variances assumed	96.4	.000	9.781	4501	.000
	Equal variances not assumed			13.061	1014.165	.000

Group Statistics

	pass success	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	Success	2803	523.7100	287.59371	5.43210
	Failure	422	456.5896	241.77080	11.76922
A_own_4v4	Success	2803	324.1401	203.32825	3.84049
	Failure	422	278.5941	188.81450	9.19135
A_opp_4v4	Success	2803	264.5732	178.16034	3.36511
	Failure	422	219.1574	154.15109	7.50396
A_tot_3v3	Success	2803	334.6309	223.73554	4.22594
	Failure	422	276.7794	197.30143	9.60448
A_own_3v3	Success	2803	161.9722	123.72651	2.33696
	Failure	422	136.8463	120.48811	5.86527

A_opp_3v3	Success	2803	158.1161	131.34510	2.48086
	Failure	422	118.5285	103.65001	5.04560
Distance	Success	2803	5.7132	4.21305	.07958
	Failure	422	3.8794	2.92268	.14227

Levene's Test
for Equality of
Variances t-test for Equality of Means

		F	Sig.	t	df	Sig. (2-tailed)
A_tot_4v4	Equal variances assumed	10.096	.001	4.558	3223	.000
	Equal variances not assumed			5.178	615.281	.000
A_own_4v4	Equal variances assumed	2.580	.108	4.329	3223	.000
	Equal variances not assumed			4.572	578.188	.000
A_opp_4v4	Equal variances assumed	9.835	.002	4.964	3223	.000
	Equal variances not assumed			5.522	603.687	.000
A_tot_3v3	Equal variances assumed	4.653	.031	5.026	3223	.000
	Equal variances not assumed			5.513	596.429	.000
A_own_3v3	Equal variances assumed	1.990	.158	3.902	3223	.000
	Equal variances not assumed			3.980	563.149	.000
A_opp_3v3	Equal variances assumed	18.951	.000	5.920	3223	.000

	Equal variances	7.041	643.514	.000
	not assumed			
Distance	Equal variances	68.718	.000	8.634 3223 .000
	assumed			
	Equal variances	11.249	715.098	.000
	not assumed			

Group Statistics

	pass success	N	Mean	Std. Deviation	Std. Error Mean
A_tot_4v4	Success	1117	439.2454	245.95922	7.35930
	Failure	161	405.2390	221.26903	17.43844
A_own_4v4	Success	1117	256.2398	170.42542	5.09927
	Failure	161	228.3812	147.58213	11.63110
A_opp_4v4	Success	1117	217.0477	152.09943	4.55094
	Failure	161	163.0924	102.99745	8.11734
A_tot_3v3	Success	1117	278.0587	190.79676	5.70879
	Failure	161	240.4078	163.71842	12.90282
A_own_3v3	Success	1117	128.2721	101.44574	3.03534
	Failure	161	109.7660	86.38860	6.80838
A_opp_3v3	Success	1117	127.0141	114.32269	3.42063
	Failure	161	82.9450	56.63596	4.46354
Distance	Success	1117	4.7529	3.66992	.10981
	Failure	161	3.3343	2.15555	.16988

Levene's Test
for Equality of
Variances t-test for Equality of Means

	F	Sig.	t	df	Sig. (2-tailed)	
A_tot_4v4	Equal variances	2.329	.127	1.660	1276	.097
	assumed					

	Equal variances			1.797	221.061	.074
	not assumed					
A_own_4v4	Equal variances	5.039	.025	1.970	1276	.049
	assumed					
	Equal variances			2.194	226.220	.029
	not assumed					
A_opp_4v4	Equal variances	20.629	.000	4.359	1276	.000
	assumed					
	Equal variances			5.798	272.531	.000
	not assumed					
A_tot_3v3	Equal variances	4.401	.036	2.381	1276	.017
	assumed					
	Equal variances			2.669	227.524	.008
	not assumed					
A_own_3v3	Equal variances	4.226	.040	2.202	1276	.028
	assumed					
	Equal variances			2.483	228.629	.014
	not assumed					
A_opp_3v3	Equal variances	38.207	.000	4.806	1276	.000
	assumed					
	Equal variances			7.837	384.124	.000
	not assumed					
Distance	Equal variances	26.831	.000	4.786	1276	.000
	assumed					
	Equal variances			7.013	313.773	.000
	not assumed					



Persönliche Daten

geboren am 1. June 1990
in Henan, China

Studium

- | | |
|----------------|--|
| 4/2016 – jetzt | Universität Bayreuth, Bayreuth
Studiengang: Sportwissenschaft (Promotion)
Schwerpunkte: Analyse von Fußballtechniken und -taktiken,
Auswahl von Athleten, Leistung von Athleten und Big Data Mining
Forschungsrichtung: Analyse der Fähigkeiten und Taktiken in Fußballspielen |
| 9/2013–6/2015 | Shanghai University of Sport, Shanghai
Hauptfach: Sportwissenschaften (Master)
Schwerpunkte: Fähigkeiten im Fußball und Taktikanalysen |
| 9/2008–6/2012 | Shanghai University of Sport, Shanghai
Hauptfach: Sportwissenschaften (Bachelor)
Schwerpunkte: Trainingswissenschaften, Fußballtrainingsmethoden |

Berufserfahrung

- | | |
|--------|--|
| 7/2018 | 23. Europäische Akademie der Sportwissenschaften (ECSS) <ul style="list-style-type: none">• “Differences in the perceived physical ability among different motor performance between German and Chinese children” Forschungsbeitrag zum Thema, um die Unterschiede zwischen deutschen und chinesischen Jugendlichen zu vergleichen• Dublin Sports Science Conference: Fortschrittliche Trainingskonzepte und sportwissenschaftliche Entwicklungsrouten in Europa. |
|--------|--|

4/2017	Hoffenheim Club Big Data Mining	<ul style="list-style-type: none"> • Die Studie zielt darauf ab, die Wettbewerbsdatenbank zu erweitern und den Verein wettbewerbsfähiger zu machen. Neben der klassischen Bundesliga-Datenanalyse wird auch der Jugendtrainingswettbewerb des Vereins als Forschungsobjekt einbezogen.
6/2017–6/2018	Universität Bayreuth, Wissenschaftlicher Mitarbeiter, Unterstützung bayerischer Athleten bei Tests der körperlichen Fitness und der Auswahl von Athleten.	<ul style="list-style-type: none"> • Unterstützung des Forschungsteams bei der Videoanalyse von Fußballspielen
11/2016-4/2017	Leipziger Jugendtrainings- und Wettkampfforschung	<ul style="list-style-type: none"> • Recherche und Analyse der vom Wettbewerbs-Tracking-Forschungsinstitut erhaltenen Datenergebnisse • Datenanalyse der großen Bundesliga-Vereine Zur Grundlagenschaffung für die Entwicklung der Spieltechnologie und des Taktikmodus
3/2014–7/2015	Shanghai Verantwortliche Sportkultur Communication Co., Ltd.	<ul style="list-style-type: none"> • Sportangebote für Personen aller Altersgruppen • Organisation von Trainings- und Wettkampfmöglichkeiten zwischen Vereinen
9/2013-10/2013	Freiwilligenarbeit - WM-Qualifikation für Asien 2014, Shanghai	

Zusätzliches

Sprachen	Deutsch:	fließend
	Englisch:	fließend
	Französisch:	fließend

EDV	MS-Office	sehr gut
	SPSS	sehr gut
	Matlab	sehr gut

Hobbys Fußball, Schwimmen, Tischtennis, Badminton, Tennis

Eidesstattliche Versicherung

Ich versichere hiermit an Eides Statt, dass ich die vorliegende Arbeit ohne unzulässige Hilfe Dritter und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe; die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht. Darüber hinaus versichere ich, dass ich weder bisher Hilfe von gewerblichen Promotionsberatern bzw. -vermittlern in Anspruch genommen habe noch künftig in Anspruch nehmen werde. Die Arbeit wurde bisher weder im Inland noch im Ausland in gleicher oder ähnlicher Form einer anderen Prüfungsbehörde vorgelegt und ist auch noch nicht veröffentlicht.

Bayreuth, 30.11.2019

Yapu Liang